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Finding New Outlets for Cotton Goods Surplus

Export Markets Offer a Partial Solution of Problem of Over-Production—Need of Change in Approach and in Methods—Some Progress Being Made at Present Time—Better Sales Methods Have Proved Great Aid—Sec. Hoover a Believer in Exports

By Louis Bader

THE expansion of the cotton-industry has been so great during the last 20 years that its capacity has been, and is, greater than the demands made upon it for some time. This is evident when we consider (1) that the world-wide growth of the industry in spindles has been 50%, while the population-increase during the same period has been only 17%; (2) that, with the exception of the abnormal years due to the World War, the dividends on capital invested in Great Britain and in the United States for the same period has averaged only about 5%; (3) that the British industry has found it necessary to control production for several extended periods during that time, because of poor business, and large curtailment has been necessary in our own industry during the last four years; (4) that, during these 20 years, excepting for the war-years, the narrowing margin between the price of raw material and the finished gray cloth has continued, indicating an increasingly keen competition for the available business; and (5) that we have a possible normal production of woven cloth of about 8,500,000,000 sq. yds. against a consumption that is figured at 6,100,000,000 sq. yds.

During the last six years, it has been quite evident in the cotton textile industry that running all the machinery at full speed for a few months each year creates a large surplus. During the rest of the year, this surplus is slowly worked off, and curtailment of production is more or less severe. This will continue to be the case so long as insufficient attention is paid to the market. Until domestic consumption and export-shipments catch up to our producing capacity, the construction of new mills should be held in abeyance. It must be apparent that present new construction (as distinguished from replacement-construction) is at the expense of mills now in existence. This is a form of economic waste.

The argument may be advanced that, by reason of more favorable location and improved machinery, the new construction is able to produce more cheaply and so is economically justified. This, however, is true only, (1) when competition forces new mills to sell their product at the lowest possible price, and (2) when the new mill replaces worn out machinery about to be discarded. The machinery in a cotton mill is the most expensive part of the plant, and can be used only for making cotton goods. When a plant must be scrapped long before it has outlived its usefulness because of the construction of a new and unnecessary plant, we have a waste. The cotton goods industry has been suffering from just this, both in this country and in England, for some time, and shows it in the material form of tremendous losses from operation.

It would seem that, when a new plant is proposed, a scientific investigation should be made as to the desirability thereof. To illustrate what such investigation would show, let us assume that in 1909 there were enough spindles to care for the then per capita consumption of cotton cloths. Investigation would then show that the per capita consumption of cotton cloths has remained the same since. The National Bureau of Economic Research in its *News Bulletin* of April 20, 1925, reports its estimates of yearly increase in population of the United States. These estimates show an average yearly increase for the last 16 years of 1.55%. Further investigation shows that during these same 15 years we had an average yearly increase in spindles of 2.18%. Unless means be found to increase the per capita consumption and unless new markets be discovered, our net yearly addition of cotton manufacturing machinery need not exceed 1.55%. To this must be added the new equipment to care for replacement. This is all the new machinery that we need to erect.

Export Markets

With a producing capacity larger than necessary and growing all the time, a real problem faces the industry in finding ways to increase the demand for the product so as to sell the normal output of the industry. A great effort has been made to increase our exports of cotton cloth and has met with considerable success. For the four-year average 1910-14, we exported 298,574,000 sq. yds., and for the four-year average 1921-1925, these exports rose to 518,000,000. Undoubtedly something more can be done in this direction to help the industry. We should go at it properly and with vigor, using the same methods necessary to sell goods in this country. We should give the customer what he wants, and do it in a pleasing manner, paying due attention to the methods necessary in a foreign country. In this way, a considerable addition to our sales in foreign markets can be effected. This is illustrated in a measure by our exports of 818,751,000 sq. yds. in 1920. We are now taking the necessary steps to secure more business from foreign markets.

Changes in Approach

Prior to 1910, all of our cotton goods shipped to foreign markets were sold through the export commission houses. These firms usually sold everything from pins to locomotives. Although special agents of the Department of Commerce studying foreign markets for the sale of our own manufactures of cotton goods nearly always reported that American cotton fabrics were the superior of other makes in those markets, we made little progress. During 1913, Great Britain shipped to her foreign markets over 7,000,000,000 yds. of cotton cloths, while we shipped to those same markets a little more than 450,000,000 yds. or about 6% of the amount shipped by Great Britain. With superior merchandise and cheaper prices for the same quality, the conclusion seems to be inescapable that our lack of success was due to the method of marketing our cloths abroad and to our indifference to this business. Export commission houses handling every conceivable kind of article could hardly be expected to push cotton goods in the way necessary to take business away from powerful and strongly intrenched competitors.

Elimination of Commission Houses

The possibilities of foreign sales and the lack of wisdom in not going after this business properly were seen during the World War. In the comparatively few years since then, the export commission house as a merchandiser has almost completely disappeared. Nearly all Worth Street commission houses and all converters as well as some dry goods jobbers are offering goods direct to the customer in foreign markets. Complete sampling campaigns are undertaken; salesmen are sent to foreign markets (not always so well equipped for the work as they should be); in some cases, resident agents are engaged: in the more important markets, branches are opened; and, in a small way, some advertising is indulged in.

Better Sales Methods

Owing partly to these better selling methods, the high point of exports was reached in 1920 when over 800,000,000 yds. of cotton cloths were shipped out. Since then our shipments, as well as those of other exporting countries, have fallen off but it is a noteworthy fact that, in the season 1923-1924, England's exports were about 4,500,000,000 yds. and those of the United States 464,000,000 yds. In the case of England, this was only about sixty per cent of her exports for 1913. In the case of the United States, the exports were slightly in excess of one hundred per cent of 1913. England has put forth great effort to recover this trade because the profitable operation of her machinery depends almost altogether upon trade with foreign markets. We, therefore, may consider that it is a notable achievement to have held the trade of 1913. This was no doubt largely due to the direct and better selling methods employed and the greater assistance rendered to the American export trade by the Department of Commerce. As we get back to what should now be the normal volume of exports, we can reasonably hope to increase these sales.

To export markets like China, the Dutch East Indies, and the near East, Great Britain and some of the Euro-

pean countries ship large quantities of cotton goods. Our shipments to these markets have dwindled to almost nothing. Dr. Julius Klien, head of the Bureau of Foreign and Domestic Commerce, points out that the Dutch East Indies import annually about $50,000,000 of cotton goods, and that our share amounts to about one-tenth of one per cent. A portion of this business, sufficiently large to be profitable, might be secured through cooperation effort on the part of the largest factors in the cotton industry. Under the authority of the Webb Act, a cooperative group might be formed to study what is needed to be done to meet the trading conditions of these large markets, and then might make the necessary effort to produce the cloth required at the price necessary to secure the business. No such cooperative effort has yet been made. The attempt to secure business from such markets has been largely a second-hand proposition, reliance heretofore having been put almost altogether on the export commission house or export broker.

If there is anyone who knows the export field and the possibilities it offers our manufacturers, it is Secretary of Commerce Herbert Hoover. He says, "American export organizations should be kept in the foreign trade field, and during the next year or two unusual assistance should be given them to tide over what will be a rather difficult period."

Russian Textile Representative Visiting U. S.

Professor Nicholas J. Kanarsky, Moskow Textile Institute, Moscow, Russia, chairman of several commissions, is at present visiting this country. The professor is chairman of a standardization committee on wool, and is very much interested in standardization here as he desires to coordinate Russian standards with those of America and England.

He is also investigating the possibilities of supplying mills of the Moscow District with rags from American rag dealers. The Amalgamated Fine Woolen Mills of the Moscow District is composed of sixteen mills, and the concern is now contemplating the erection of a large new woolen and worsted mill in Moscow, Russia. The professor who is manager of the engineering department is interested in getting information on the best equipment for the new mill, as it is to be equipped in the most modern American plan possible in regard to machinery, transportation facilities, humidification, etc.

Toronto Hosiery Outing

TORONTO, ONT., CANADA.—The annual outing of the Toronto Hosiery Co., Ltd., was held recently at Port Dalhousie, a two-hour sail across the lake from Toronto. The day was all that could be desired and the picnic enjoyed immensely by the employes and their families.

Growth of Wool Cooperatives

Volume of Wool Handled in This Way Has Doubled in Six Years

WASHINGTON, D. C.

WOOL has been sold cooperatively by farmers and ranchers in the United States for half a century or more. The oldest cooperative wool marketing organization in existence is believed to be the Putnam County Wool Growers Association of Greencastle, Ind. Farmers in that locality have been selling wool cooperatively since 1885. There is little doubt, according to the Department of Agriculture, that the beginning of cooperative wool marketing in this country dates back considerably farther than the available records go.

Nevertheless, the largest growth in the wool cooperative movement has taken place in the last six years. There was but little increase in the number of wool cooperative associations in the 10 years prior to 1919. Since that year, however, the number has more than doubled. Moreover, about 75% of the wool handled cooperatively in 1924, was handled by regional or State-wide organizations. Twenty-two associations of this type, operating in 22 States, handled nearly 12,500,000 lbs. of wool in 1924. Their total membership was in the neighborhood of 30,000.

Cooperative handling of wool is facilitated by the fact that the commodity is practically nonperishable. Another advantage to the farmer is that wool selling is not a complicated business, according to the Department of Agriculture. Sometimes a single sale will dispose of a year's output for a large number of wool growers. These features of the crop have often enabled wool growers to cooperate in marketing without any formal organization, and without any large amount of capital. Local wool cooperatives have frequently followed this method. In recent years, however, the rise of State and regional associations has called for a greater measure of formal organization.

Fairly comprehensive data have been compiled by the department regarding active wool marketing associations in all parts of the United States. It has detailed reports from 68 organizations located in 32 States. Twenty-seven of these associations are independent locals. Twenty-two are regional or State-wide pools, one is a sales agency doing a national business, 11 are associations that handle wool only incidentally, and seven are educational or service organizations. While this list may not include all the active wool cooperatives in the country, it is believed to represent considerably more than 80% of all the cooperative business done in wool.

Eighteen of the 27 independent local cooperative associations have been organized since 1916. Nearly 4,000,000 lbs. of wool were handled in 1924 by the 27 independent local associations. Ohio has more wool producers in cooperative associations than any other State. Oregon holds the second place in this respect, and Indiana, South Dakota, New York, Tennessee and West Virginia follow in the order given. Five regional associations in 1924 each had a membership exceeding 1,500. The other associations of this type had memberships of less than 1,500. Wool cooperative associations in 29 States handled 16,323,594 lbs. of

(Continued on page 73)

COTTON CONSUMPTION AND ACTIVE SPINDLES

Cotton consumed, cotton on hand and active cotton spindles, as reported by the Department of Commerce, Bureau of the Census for the month of August, 1925 and 1924, with statistics of cotton consumed, for the 12 months ending July 31, is given below. The statistics of cotton in this report are given in running bales, counting round as half bales, except foreign cotton, which is in equivalent 500-pound bales. (Linters not included.)

Locality	Year	Cotton consumed during (bales) — August	Cotton consumed during (bales) — 12 months ending July 31	Cotton on hand August 31 — In consuming establishments (bales)	Cotton on hand August 31 — In public storage and at compresses (bales)	Cotton spindles active during August (number)
United States	1925	*448,665	*6,191,349	*680,527	*1,040,178	31,269,774
	1924	357,380	5,680,554	552,789	802,064	29,010,630
Cotton-growing States	1925	302,604	4,218,611	335,220	948,151	16,479,272
	1924	245,779	3,858,317	226,229	705,111	15,291,114
New England States	1925	121,187	1,639,021	300,668	56,683	13,183,432
	1924	93,018	1,524,777	283,981	52,407	12,192,552
All other States	1925	24,874	333,717	44,639	35,344	1,607,070
	1924	18,583	287,460	42,579	44,546	1,526,964

* Includes 16,167 Eg. 6,197 other for. 764 Am-Eg and 265 sea-island consumed, 41,722 Eg. 29,278 other for. 2,263 Am-Eg and 2,500 sea-island in consuming est., and 7,887 Eg. 14,758 other for. 1,678 Am-Eg and 515 sea-island in public storage. 12-months consumption 190,833 Eg. 83,557 other for. 19,252 Am-Eg and 3,968 sea-island.

Linters not included above were 63,583 bales consumed during August in 1925 and 44,926 bales in 1924; 97,230 bales on hand in consuming establishments on August 31, 1925, and 82,816 bales in 1924; and 22,747 bales in public storage and at compresses in 1925, and 44,239 bales in 1924. Linters consumed during twelve months ending July 31 amounted to 651,065 bales in 1925 and 536,738 bales in 1924.

Spinners' Outing in Phila.

Large Delegation from Boston—Novel Entertainment Features

Elaborate arrangements have been completed by the Field Day Committee of the National Association of Worsted and Woolen Spinners for their annual outing to be held Monday, September 21, at the Manufacturers' Country Club, near Philadelphia. The committee, which has been working steadily during the past months to make this occasion a success, announces that according to acceptances already in hand it will be the largest outing ever held by the association. The committee in charge of the day's program is composed of Ernest Townson, Kent Mfg. Co., Clifton Heights, chairman, Walter D. Larzelere and Wm. H. Richardson of Philadelphia, Edward Legge, of Percy E. Legge and Howard Young, of Davis Young and Anderson, representing Boston.

Spinners and their guests coming from New England will arrive in Philadelphia early Monday morning on a special car, which has been engaged, detraining at North Philadelphia station, where the committee will arrange to have them taken to the new Manufacturers' Country Club, situated in one of the attractive suburban districts. It is believed the drive to the club will furnish one of the enjoyable features to visitors. Breakfast will be served upon arrival at the clubhouse after which the day's sports program will begin. The usual golf tournament will be played for possession of the President's Cup which was donated several years ago by a former president of the Association, N. B. Kneass Brooks.

Base-Ball Game

In addition to the formal play in the tournament, there will be a putting contest in the afternoon for which attractive prizes will be offered. A base-ball game, which is expected to prove one of the most entertaining sports of the day, will be played, with teams representing Boston and Philadelphia contending for the inter-city championship. In the evening an informal dinner will be held at the club after which several novel features in the way of entertainment will be presented, details in regard to these being closely guarded by the committee until the day of the outing.

Cotton in Alabama Is All Open

BIRMINGHAM, ALA. — Cotton in Alabama is opening earlier than ever known before in the history of cotton raising in the State. According to reports from all sections of the State the entire cotton crop of Alabama is now practically open. This is said to be due largely to the unusual dry, hot weather which prevailed during the last of August and the first part of September. According to official reports the crop this year will be equally as large, and the staple as good, as was the crop of 1924.

Editors
Charles H. Clark Vernon E. Carroll
Clarence Hutton Douglas G. Woolf

EDITORIAL

We Believe
in the Conservation and Protection
of Domestic Industries

Textile Tide Turned

IT appears as though the tide has definitely turned in the textile selling markets, almost without exception. Raw materials, with the exception of wool are higher than they were a month ago and there is nothing to indicate a change in trend. This alone is sufficient to elminate much of the uncertainty which has dominated the entire textile situation and which has been the chief cause for hand-to-mouth buying. Add to this an amount of curtailment in textile mills unprecedented for any season of the year, with the consequent shrinkage of stocks and difficulty of securing prompt delivery and you have a combination of conditions which should naturally cause the buyer to alter his position toward the market.

No one is growing hysterical over the situation, for there are spots in one division of the market or another that improvement has not touched. That the greater readiness of buyers to anticipate requirements means the abandonment of the hand-to-mouth policy is not generally believed, but at the same time it is felt that on a good many lines of goods the pursuance of this policy has brought about a condition which should cause the average buyer considerable apprehension and which may develop a decided modification of sales policy.

In the cotton goods field the upward trend of raw material has had the most potent influence on prices but added to this the general mill curtailment, both in the South and in New England, both voluntary and enforced, has been a prominent contributing factor not only to the strengthening of prices but also to the increased buying of the trade. The latter know that stocks are depleted, for otherwise there would not be difficulty in securing delivery such as is being experienced at the present time. It is encouraging to note in this division a volume of orders which is gradually spreading to many other lines than those in which the movement originally started.

In the silk market raw material has likewise played an important part in continued buying as well as general firmness in price. Production continues at a high rate and there seems little prospect of a falling off due to high raw material costs. Manufacturers here, as well as in the cotton manufacturing section, are said to have no accumulation of raw stock or of manufactured goods and their purchases on present levels should be a factor in the maintenance of prices all along the line.

Wool is the exception in the raw material markets, although prices are much more firmly maintained than was the case a few months ago. The opening of the London sales this week indicates a slightly higher basis. The fabric situation in this division is somewhat mixed. Labor difficulties in the women's garment trade may interfere with liberal operations on dress goods fabrics for the time being, but in men's wear it is reported that a wider distribution on original orders was secured than was thought likely at the opening of the season.

It now remains to be determined whether duplicate orders will take care of the majority of mills' product. As far as the outlook is concerned there seems every indication that business on light-weights will increase steadily when clothiers gain some idea of their trade's requirements and that there will be a decided call for heavy-weight suitings and overcoatings. The latter have been bought sparingly and requirements are certainly nowhere near filled. More or less congestion and failure to secure desired merchandise may be witnessed before long.

From the above it would seem as though the generally healthy business situation throughout the country which has not been reflected in the textile industry will reach into this industrial field and that a more satisfactory period both for manufacturers and for the distributing traders will ensue.

* * *

A New Note in Women's Wear Fabrics

WHOLLY changed fabrics are being shown to buyers of women's wear for next spring from any which they have seen hitherto. Behind the really new note in this branch of the woolen and worsted goods industry, is the rapid development of silk and rayon mixtures. Sellers admit and the new fabrics disclose the fact that the effects produced would be impossible without the admixture of these glossy fibres.

Opening of their spring line by the Botany Worsted Mills on Thursday of this week was particularly interesting and significant because of the fact that these factors discarded all precedent and instead of using the silk and rayon for brilliant decorations and multi-color effects, they used the mixture to soften monotone and two tone effects and to lend suppleness to the fabric. Their new line includes no novelties except for their prints on flannel and wool taffeta, but instead presents a group of exclusive and carefully planned weaves in relatively sheer fabrics finished in soft colors. Out of about 30 distinctly different fabrics, only four or five appear without the introduction of rayon or silk.

This conservative use of plain fabrics coming from so good a source of style authority is significant of what may be the trend through the bulk production of the market in the near future. Though at first glance the value of silk and rayon introduction appears to be the chance for bright colors and gloss, and it is being generally so used, there are good authorities on the market who believe that the more lasting method is the deeper mixture of these brilliant fibres for the production of a subtle change in texture of woolens and worsteds, some of which Botany has fittingly called "Mother of Pearl" effects.

The color range of this latest spring opening is also distinctive in that the pastels have been brought back again in great variety ranging down to the very lighest shades. The whole offering is a sharp change from the commonplace fabrics and the commanding colors of recent seasons.

* * *

The Coming Chemical Show

TEXTILE WORLD has followed the policy of utter frankness in discussion of the various expositions appealing to the textile industry. It has believed in the fundamental idea of an exposition but has held that the number of such shows must be kept down and that each must have outstanding textile interest if it is to have the support of our industry. As a consequence of this policy, it stated editorially at the conclusion of the last Chemical Exposition that phases pertaining to textile manufacture had been subordinated to those relating to chemical manufacture.

This year TEXTILE WORLD can be as generous with its endorsement as it was then with its criticism. The plan outlined for the Tenth Exposition of Chemical Industries to be held at the Grand Central Palace, New York, Sept. 28 to Oct. 3, includes so much of vital interest to the textile industry that it will warrant the attendance and study of our manufacturers in general. The exhibits of rayon and the consideration of this fibre in meetings to be held in conjunction with the show, are of themselves sufficient to command widespread interest and to repay visitors for the time spent at the Palace. The meeting of the National Association of Finishers of Cotton Fabrics to be held on Tuesday of that week is another vital reason for enthusiasm.

The science of chemistry underlies a large part of the technique of textile manufacture. Exploitation of the application of this science to our industry, as planned for this year's Chemical Show, earns for that exposition an established place in the textile calendar.

* * *

A Triple Purpose

LAST year the management of the Carolinas Exposition introduced a feature which lifted that show above the level of routine exhibitions and gave it a real meaning in its relation to textile manufacture. This feature was the Textile Diversification Dinner, one of the best attended and most important textile meetings ever held in the South.

This year it will retain this feature and in addition will include other phases which will make the show a purposeful one. The style exposition and contest will have the double object of developing style consciousness so far as textiles are concerned, and of adding impetus to the consumption of cotton goods.

Linking up these vital factors of manufacturing diversification, style development and expanding textile use should guarantee real success to the Carolinas Exposition to be held at Charlotte, N. C., Sept. 21 to Oct. 3.

Wool Trade Outing

Boston Association Holds Largely Attended Field Day

BOSTON.—About 500 members and invited guests attended the ninth annual outing of the Boston Wool Trade Association held at the Vesper Country Club, Lowell, Mass., Tuesday, Sept. 15. The band of the Arlington Mills supplied music during the day and an excellent lunch was available between the hours of 12 to 3:30 p. m.

In the afternoon, Francis Ouimet and Jesse L. Guilford played in a match in which Elmer Ward, "Buster" Forte, C. Beaman, D. Jones, Perry Glover and Capt. K. D. Maccoll of the association also competed. The association team won by 4 to 3.

There were a large number of members and guests in the regular golf contest, but prizes were reserved for members in the three classes. The winners in these were: first division, best gross, J. L. Guilford, 77; second division, best gross, H. L. Ewer, 87; third division, best gross, B. Dean, 97.

Whippet racing was held under the auspices of the Boston Whippet Club. Impromptu events included base running, hit and run, fungo batting for distance, long distance throwing and infield throwing of baseball for accuracy.

Leggin Cloth Bids Opened

Four Concerns Submit Proposals to Philadelphia Depot

Bids for supplying the Philadelphia Quartermaster Depot, 21st St. & Oregon Ave., with 58,250 yds., of olive drab leggin cloth, worsted warp, woolen filling, 17.5 to 18.5 ozs., per linear yard, 72 in. to 74 in. wide, were opened Sept. 16, at 10 a. m. standard time. Four concerns submitted bids on this material: J. P. Stevens & Co., Inc., New York, quoted $2.92½ a yd., on 29,000 yds., and $2.97½ on 29,250 yds., terms 3% 10 days, 2% 20 days, or 1% 30 days. Delivery, 1,000 yds., within 56 days; 3,000 yds., within 63 days; 4,000 yds., within 70 days and the balance at the rate of 5,000 yds., weekly, excepting the last shipment which would be 5,250 yds.

Worumbo Co., New York, offered to supply this material at $2.91 75/100 on 30,000 yds., or $2.94 875/1000 for the total quantity, both quotations being net. Delivery of 1,000 yds., to be made within 6 weeks and 4,000 yds., weekly thereafter. Delivery of 30,000 yds., to be complete in 14 weeks and total to be completed in 22 weeks. Kent Mfg. Co., Clifton Heights, Pa., bid $2.93 on 7,500 yds., $3.03 on 10,000 yds., $3.05 on 15,000., $3.07 on 15,000 yds., $3.09 on 10,750 yds., all quotations being net. Delivery to start within 30 days and 10,000 yds., monthly thereafter. Patterson & Greenough, New York, bid $3.14 net. Delivery to start within 8 weeks and to be completed within 26 weeks. The last bid was received after time for opening proposals but was considered with the others.

"NOVEL," AT LEAST

A. W. Stoltz, of Mission, Texas, has made a novel suggestion to the Department of Agriculture for the use of the $238,000 of excess profits it recently announced was unclaimed on account of wool sold in 1918, and for which the Department has had an avalanche of applications. Mr. Stoltz wants the money turned over to him to buy at $7.00 an acre a 39,000 acre Texas ranch, which he would sell in small farm plots at $10.00 an acre. He wrote: "I can do it in less time than it will take for the Democratic party to elect a Democratic president."

R. I. Sales Campaign Ends

Support of Own State Sought by R. I. Manufacturers

PAWTUCKET, R. I.—Rhode Island's unique textile exhibition which was held during the week of Sept. 7 to 12 in the Old Slater Mill, Pawtucket, as reported in these columns last week, drew an attendance of 15,000 persons. The show was held under the auspices of the Rhode Island Loyalty League in cooperation with mill men in the State.

A sales event during which merchants in every city and town held window displays and conducted novel features to bring the fine quality of Rhode Island textile products to the attention of the public and the exhibit were the features of "Textile Appreciation Week." These two events brought to a successful conclusion the campaign of the Rhode Island Loyalty League to promote the welfare of the textile industry of the State.

Leaders in the Rhode Island Loyalty League, an organization comprised of civic groups, chambers of commerce, women's clubs, etc., conducted the campaign to inform the public of the beauty and durability of fabrics made in the mills in this section of the country and to attain widespread publicity for the quality of Rhode Island products.

Several new lines were among the exhibits. Rhea, a new product of the Lonsdale Co., made from China grass, having the sheen of linen, and said to be stronger than either linen or cotton, was shown. Printed broadcloths in Parisian designs were also shown by the Lonsdale Co.

Combination fabrics of silk, rayon and cotton, all three of which materials take dye differently with beautiful combinations of shades resulting, and shadow lawns were the new lines of the Valley Falls Co. at the show.

Joseph Benn Corp. showed alpaca chiffon, a mixture of alpaca and mohair which gives a fabric different from either material. Mohair rugs which have a fine lustre and great

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Bradford-Durfee Opens

Fall River School Starts New Year—New Students

FALL RIVER, MASS.—The Bradford Durfee Textile School opened its day classes last Monday for the new school year. The entering class comprises the following new men:

Mark Azza, West Barrington, R. I.; Harold Bradshaw, Fall River; William H. Burns, Fall River; William Callahan, Fall River; Elwood F. Clark, Taunton; Paul A. Connelly, Fall River; James F. Conroy, Fall River; James M. Cooper, Providence, R. I.; Edward J. Downey, Fall River; Herman W. Gersch, Jr., South Swansea; Harry Gordon, Fall River; Theodore Guay, Fall River; George J. Hatch, Brookline; James F. Healey, Fall River; Robert Helfenbein, Fall River; Albert V. Holmes, Malden; Vincent J. Kelly, Fall River; Wellington H. King, Pottersville; Barney Lovit, Fall River; Aime Marquis, Fall River; John T. Meagher, Fall River; Karl Reaber, Jr., Apponaug, R. I.

Registration for students in the day classes will be open for the next two weeks and, as in former years, it is expected that there will be additional men enrolled during that time.

There has been only one change in the instruction staff this year. Bernard S. Hillman, assistant in the Chemistry and Dyeing Department, has resigned to accept a position with the Sidney Blumenthal & Co. of Shelton, Conn. This vacancy has been filled by the appointment of James J. McArdle, a graduate from the Chemistry and Dyeing course.

Registration for the evening classes, which open Monday evening, Sept. 21, was held on Thursday and Friday evening of last week. Registration in this department of the school will also be open during the first two weeks of evening classes.

Wider Scope for School

New Bedford School Plans 2-Year Course for Boys

NEW BEDFORD, MASS.—The New Bedford Textile School is confronted with one of the largest entering day-school classes that the institution has ever had. With a record number of applicants for entrance already on the list, Principal William Smith believes that the facilities of the school will be taxed to the limit for the coming term. More than 30 have already entered for the day classes, and as there will be at least 60 of the upper classmen returning, the number of day students will probably exceed 100.

The capacity of the school for day students is in the neighborhood of 120, an average of 40 to each of the three-year classes. An important new step authorized by the board of management is the establishment of a new two-year course for younger students, and this course is now being worked out by the faculty. It is designed to take care of grammar school graduates with a view to filling, in a way, the function of vocational school training. An overwhelming enrollment at the New Bedford Vocational School has demonstrated the industrial trend of youths wishing to continue their training after leaving grammar school.

In explaining the reasons for the new course, Principal Smith said: "We have been confining our student body to high school graduates and students of that age, but that makes them 17 or 18 years old when they enter textile school and 20 to 22 years old when they complete our courses. When they are ready to go into a mill they are at an age when they expect to get a man's wage, and when they experience difficulty in commanding that they deem their time spent in the school as wasted. Our trustees believe that there is room for younger students who can be given a two-year course, with somewhat less advanced work, and made ready for practical mill work at an age when they can still feel satisfied to work for a beginner's pay in the mill and get sufficient experience to be worth a man's pay by the time they reach 22."

There have been no faculty changes at the school outside of the resignation of Albert Grimshaw, head of the dyeing and finishing department of the school. This place has not yet been filled, but there are several applicants being considered. Mr. Smith announces that he has two scholarships available at the school.

Report Brogon Mills Sold to Appleton Co.

It is reported on the best authority that the purchaser of the Brogon Mills, Anderson, S. C., is the Appleton Co., Lowell, Mass., manufacturers of outing flannel, ginghams, etc. The directors have favored the sale of the plant to the company and meeting of the stockholders will be held on Oct. 13, at which time the proposition will be submitted for their acceptance. No statement as to the proposed purchase price is available but current market gossip has it that it is in a neighborhood of $40.00 per spindle.

The latest report on the equipment of the Brogon plant, which manufactures outing flannel is that it has 90 cards, 30,468 ring spindles and 900 looms. Woodward, Baldwin & Co., are the selling agents. It is stated that the new plant will increase the facilities of the Appleton Co. about 25%. It is expected that eventually plans for enlargement will be worked out although nothing definitely has been determined as yet on this matter.

Texas Textile Asso. Meets

The fall meeting of the Texas Textile Association will be held Friday and Saturday, Oct. 9-10, at Denison, Texas. The program and entertainment are under the direction of H. G. Edmuston, superintendent of the Denison (Tex) Cotton Mills, vice-president of the Association. Grover C. Gilling, superintendent of the Brazos Valley Cotton Mills, West, Texas, is president.

Georgia Executives Meet

Knowledge of Costs and Economy of Power Stressed

ATLANTA, GA.—Discussion on use of automatic temperature regulating devices in steam lines to cylinders and elsewhere on slashers, created interest at the session of the Textile Operating Executives of Georgia, held here on Sept. 15. Accurate knowledge of cost of every construction was urged as a necessity if cotton mills are to operate profitably.

The returning of worn out supplies to supply room before issuing new supplies and charging shuttles and belts to individual looms were recommended to reduce supply bills.

A binder with rubber cushion under the leather strip was advocated to cut power consumption by looms.

D. W. Anderson of New Holland and W. W. Arnold, Jr., of Manchester, led the discussion on weaving and slashing, respectively. Frank Asbury of La Grange and Frank Williams of Fairfax, Ala., were elected members of the executive committee.

[Complete details of the meeting will be published in a subsequent issue of TEXTILE WORLD.]

Farmers Able to Hold Cotton in Texas

AUSTIN, TEXAS.—It is evident to local authorities that the 1925 cotton crop in the drouth affected section of Texas will not be forced on the market in excess of the ability of the market to absorb it; in fact there is every reason to believe that the entire Texas crop will be marketed slowly this year.

In about 55 counties in the center of the State of Texas the continued drouth, which really extends back into 1924, has cut the cotton crop to one-fourth or less of normal production.

Bank deposits in those sections where the crop is good indicate that the banks, with the usual outside co-operation, will be amply able to finance the marketing of the crop in their localities without unduly forcing the market, and in this the farmers are in good enough financial shape to assist.

Farmers in the drouth district have been fearing that necessity would force them to rapidly market their short crop, but they now have assurance that this will not be the case. Texas State Treasurer Hatcher has announced that there is $3,000,000 in the State treasury, which, with the consent of the Depository Board, will be placed with bonded State banks in the affected area at 4% interest, to be loaned under proper conditions to the farmers. This, Treasurer Hatcher says, can be done under the Texas law, which imposes on him the duty of depositing the State's surplus funds with the State and reserve depositories at a rate of interest fixed by the rate making board. The Texas Farm Bureau Cotton Association also has funds available to the extent of about $3,000,000.

Diversification Dinner Sept. 29

Important Event Scheduled in Conjunction with Carolinas' Exposition at Charlotte, N. C.

PLANS are developing rapidly for the Textile Diversification Dinner to be held at Charlotte, N. C., in conjunction with the Carolinas Exposition, which will take place in that city Sept. 21 to Oct. 3. The date of the dinner has been set for Tuesday, Sept. 29 instead of Friday, Sept. 25, as originally announced. It will be held at the Charlotte Chamber of Commerce.

The principal speaker at the dinner will be Theodore H. Price, editor of *Commerce & Finance*, and in addition the following well-known textile authorities will deliver addresses: Ben F. Geer, president Judson Mills, Greenville, S. C.; W. J. Vereen of Moultrie, Ga., president of the American Cotton Manufacturers Association; Geo. S. Harris of Atlanta, president of the Georgia Cotton Manufacturers Association; J. E. Sirrine, president J. E. Sirrine & Co., mill engineers, Greenville, S. C., and Colonel Leroy Springs of Lancaster, S. C.

W. S. Lee, vice-president of the Southern Power Co., will act as toastmaster at the dinner and arrangements are being made to seat 850 cotton mill executives, bankers and prominent business men of the East and South.

In announcing this event, the Carolinas Exposition Co. comments as follows:

"The Textile Diversification Dinner will be one of the big outstanding events held during the coming exposition.

"Last year 650 prominent business men attended this dinner and it was necessary to turn away over 150 who desired to be present.

"It was an event national in its significance and was covered in an elaborate fashion by all of the eastern financial papers and trade magazines. TEXTILE WORLD, of New York, devoted seven solid pages to an account of the proceedings at this dinner. Seldom if ever before in the United States have so many mill officials been brought together at one time.

"Since that dinner the subject of diversification has become almost a national slogan and the movement towards diversifying textile production, starting at this dinner, has made headway in all parts of the United States. Because of this fact intense interest centers about the subject and with the strong array of speakers and the elaborate program planned, it is certain that fully 850 men of prominence will attend this year.

"Plans for entertaining guests during their visit to Charlotte as well as complete plans for arranging the dinner, are under the direction of the following committee; S. B. Alexander, chairman, J. Norman Pease, E. P. Coles, Norman A. Cocke, P. L. McMahon, Wills Hunter, Wm. H. Porcher, Fred H. White."

Russia's Cotton, Flax and Hemp Crops Increasing

WASHINGTON, D. C.—Late estimates received by the Russian Information Bureau here show large increases in the so-called industrial crops of the Soviet Union over last year.

The cotton crop is expected to be 33% larger than in 1924. It is estimated at 666,000 tons of raw cotton which will yield about 189,000 tons of ginned cotton as compared with a pre-war production of between 234,000 and 252,000 tons of ginned cotton.

The crop of long staple flax is estimated at 288,000 tons as compared with 216,000 tons last year. Hemp is expected to give a yield of 486,000 tons, as compared with 306,000 tons in 1924.

TEXTILE CALENDAR

National Association of Worsted and Woolen Spinners, Fifth Annual Field Day, Manufacturers Country Club, Philadelphia, Pa., Sept. 21, 1925.

Made-in-Carolinas Exposition, Charlotte, N. C., Sept. 21–Oct. 3, 1925.

Southern Wholesale Dry Goods Association, Divisions 1 and 2, Meeting and Dinner, Charlotte, N. C., Sept. 24, 1925.

Tenth Exposition of Chemical Industries, Grand Central Palace, New York, Sept. 28–Oct. 3, 1925.

Committee D-13, American Society for Testing Materials, Fall Meeting, Greenville, S. C., Oct. 5–6, 1925.

Exhibit of Textiles Made in New England, Boston Art Club, Boston, Mass., Oct. 7–24, 1925.

American Association of Textile Chemists and Colorists, Southern Section, Annual Meeting, Greenville, S. C., Oct. 10, 1925.

National Association of Cotton Manufacturers, Annual Convention, Copley Plaza Hotel, Boston, Oct. 14–15, 1925.

Southern Textile Association, Semi-Annual Meeting, Columbus, Ga., Oct. 16–17, 1925.

Fourth National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York, Nov. 30–Dec. 5, 1925.

Knitting Arts Exhibition and Annual Convention of National Association of Hosiery & Underwear Manufacturers, Philadelphia, March 22–26, 1926.

International Textile Exposition, Textile Exhibitors Association, Mechanics Hall, Boston, April 12–17, 1926.

National Association of Cotton Manufacturers, Spring Meeting, Boston, Mass., April 13–14, 1926.

Southern Textile Exposition, Textile Hall, Greenville, S. C., Nov. 1–6, 1926.

Botany's New Spring Line

Uses Silk and Rayon—Stresses Plain Rich Effects

The showing of spring, 1926, fabrics by the Botany Worsted Mills which began on Thursday, Sept. 17, is embellished by the presentation of model garments made from their new lines. This feature was carried through Friday and Saturday also in their offices at 200 Fifth avenue.

Silk and Rayon in Mixture

The fabric offerings show a courageous departure from the past. Not only is there an absence of multi-colored effects, except on the printed flannel and taffeta de laine, but in virtually every one of the new numbers silk or rayon plays an important part in mixture. The fabrics are all light in weight ranging from 5½ oz. for the lightest suiting to 13 oz. for the heaviest coating, but there is no sense of fragility about them. In fact their durability is stressed. The line presents rich effects, some almost of a hand loom texture, in fabrics which have much dignity and beauty yet which are not extremely high in price, ranging from $2.25 to $4.35.

In pricing the spring line calculation was made upon lower production costs, with the result that excellent values are offered.

The opening shows a radical change in design, texture and quality of production. In appearance the listed coatings, suitings, ensemble and dress fabrics present a strongly defined trend toward metal and mother-of-pearl effects, due to the introduction of silk in the construction of both woolens and worsteds. A second change is found in the noticeably lighter weights predominating in the line.

Sheer Fabrics Presented

In the lightest of the fabrics, shimmering mosaic patterns, chevrons and broken block devisings are featured. In styling, the designs largely tend to delicate traceries and almost indistinguishable parallel lines in great variety. Where the design presents a definite motif, small triangles, blocks and regularly spaced bars and plaidings in metal tone prevail. More familiar plain fabrics, also lustrous in character, are reps, ottomans, satin twills, taffetas, crepe mousselines, cheviots, diagonals and tapestry weaves. Two-tone combinations, with and without the metal or pearl lusters, are also noted in a number of reversible effects.

Confidence in reps and coverts is expressed in the variety of both plain and novel versions submitted. Glace twills are also included.

Among the various homespun or tweed-like coatings and dress fabrics of sturdy type, is a notably fine light-weight basket weave dress material featured under the name, Baskeen, which is only 5½ oz. though appearing to be heavier.

Coatings are Light-Weight

In the list of town-wear coatings, Scotney is a featured specialty in tapestry weave, illustrating a conserva-

tive introduction of silk with wool in a 10 ounce number. An extreme version is Manitou, an 11½ ounce coating in broken blocks worked up in lustrous parallel lines.

Ottonia is a 9 ounce number showing a flat ottoman cord with a silky reverse side in strong contrast, suitable for use as trimming.

Among the sports coatings without silk, Glennaire submits a mannish inch block tweed pattern in light and dark mixtures which is Scotch in inspiration. Durham is a sturdy tweed with two tones due to silk mixture, while Bottonala is at its best in white, offered as an ideal beach and practical sports novelty of 13 ounce weight.

Of the dress weights, the list of silk and worsted novelties includes Blocksheen, a high glaze reversible fabric shown in two types of block patterns. Among the lustrous diagonals, Novello submits a reversible covert finish with a diagonal face, Cordevere showing the diagonal reverse.

The reps series presents Repeau, of fine weave and finish, a featured number of the line and Moleen, both of high bloom without silk. Emphasis upon a 9½ ounce metal shot number introduces Metal-Tone a super covert rep, while Shelbourne, of 8 ounces, shows a broken plaid of fine light and dark lines.

A de luxe series is presented as the pastel cloths, high grade broadcloth which bring forward an entirely new range of shades. They are for coating use.

Printed Specialties

Among the popular sports numbers are the new printed specialties of 54 inch width, taffeta-de-laine and Botany flannels being offered in closely spaced and scattered patterns in angular, block, mosaic and rosette motifs. Among them are new checks in two tones of one color with contrasting plain borders. Also narrow and wide borders especially designed for jumper dresses, and sleeve and collar trim. Forty new patterns are ready.

The so-called "pearl" effects are produced by the use of white silk or rayon mixtures and the "metal" effects use the silk or rayon in color.

In the color range great importance is attached to pastels of which 16 new shades are shown. The pastel range covers 39 shades in all. In the fabrics there are the "Dusty Pastels" which effect is gained by flecking with a white silk or rayon mixture.

Botany anticipates great importance to gray next spring. The taupe grays have been established this fall but the cooler metal grays are the spring development. Alpine blue and the Bois de Rose shades are also good.

The garments exhibited at the Botany opening with the name of the maker follow:

Tappé, Ensemble costume; Kondazian, Coat dress; Louise Barnes Gallagher, Ensemble costume; Charlotte Lederer, Costume ensemble, Afternoon frock and Jumper dress; Mayer Chic, Two coats and one Tailored dress; Tuzzoli, Two coats and one suit; Wm. Bloom, Sports coat; Wm. H. Davidow Sons Co., Jump-

(*Continued on page* 85)

OBITUARY

Robert S. Reinhardt

Robert S. Reinhardt, president of the Elm Grove Cotton Mills, Lincolnton, S. C., died last Friday morning at his home in Lincolnton after a short illness and as a result of a heart attack. Mr. Reinhardt was born at Rehobeth Furnace in 1858. His father, Franklin M. Reinhardt was a successful iron master. In 1889, with his brother, J. E. Reinhardt, he purchased the Elm Grove Cotton Mill built on the Catawba River near Lincolnton three years before. Since that date he has been the active head of the company, which is well known as spinners of cotton yarns for the trade. The reputation of the plant for high grade yarn is largely due to the efforts of Mr. Reinhardt, who was recognized throughout the South as well as in the selling markets of the country, as one of the most dependable spinners in the trade.

Robert S. Reinhardt

Mr. Reinhardt was instrumetal in forming the Southern Cotton Spinners Association, which was the origin of the American Cotton Manufacturers Association. He called the first meeting of spinners together at Charlotte on May 15, 1897; Mr. Reinhardt presided and due largely to his efforts the Spinners' Association was formed. The original officials of the Association were Col. J. T. Anthony, of Charlotte, president; A. P. Rhyne, Mt. Holly, vice-president, and George B. Hiss, secretary and treasurer. In 1903 this organization was merged into the American Cotton Manufacturers Association, and in the following year Mr. Reinhardt was chosen president. He always maintained a lively interest in the affairs of the organization and was present at practically all of its sessions, being frequently called upon for his advice and counsel. He was prominently identified with the Masonic Order, being Past Potentate of Oasis Temple and a prominent Shriner. He had been one of the Temple's representatives at the Imperial Council for twenty years. A large body of Masons attended the funeral. He maintained a summer home at Blowing Rock, N. C., where several weeks ago he suffered a similar attack. He spent his winters at Crescent City, Fla. He is survived by a widow, two daughters, and one son, R. S. Reinhardt, Jr., who with J. E. Reinhardt, a brother of the deceased, is connected with the plant at Lincolnton. Mr. Reinhardt had a wide circle of friends, not only among southern spinners but in the distributing trade as well with whom his genial personality was always a matter of delight, while his sage advice based on many years of practical experience was something that will be sorely missed.

Robert B. Cameron

Robert B. Cameron, for the last three years accountant for the Monument Mills, Housatonic, Mass., died in a New York hospital on Sept. 6, where he had been for treatment. He was 35 years old and came from New York. Mr. Cameron leaves a widow and four children, his parents, and a brother in New York. He was a member of the Masonic fraternity. The funeral and burial was in Housatonic.

Owen McGloin

Owen McGloin, for more than 45 years overseer of carding at the Elmdale Mill of S. F. Scott & Sons, Inc., Uxbridge, Mass., until his retirement a few years ago, died at his home in that town on Sept. 8, after a long illness. He was a native of Blackstone, Mass., 70 years old and had lived in Uxbridge for more than 60 years. He is survived by two sons and two daughters.

William J. Sterling

William J. Sterling, for nearly fifty years identified with the textile industry of Amsterdam, N. Y., died at his home in that city from a complication of diseases. He was about 65 years old. He had been employed as master mechanic of Morris Mill No. 3 for the last 40 years.

Arthur J. Stone

Arthur J. Stone, who for many years operated a knitting mill at Philmont, N. Y., died at New Haven, Conn., on Sept. 12 after a brief illness. He was 55 years old and was born at Waterford, N. Y.

TEXTILE MARKETS IN BRIEF

Cotton Markets: **Upward movement of cotton is dominating influence in goods market. Considerable activity has accompanied the rise. Print cloths have led the market, gaining ½ to 1c in a week. Finished goods strong with advances likely in some quarters. Yarns are in hands of similar upward movement.**

Wool Markets: **Spring opening by Botany Worsted Mills discloses simple, single or two-tone effects with abandonment of multi-color novelties. All but a few on the lines are silk and rayon mixtures. In men's wear there has been a drive on cheviots by buyers for use in double-breasted suits. Overcoatings have not yet been awakened. Cold weather holding back consumer interest in fall goods. Men's wear and knitting worsted yarns are in fair request; dress goods interest quiet; prices slightly easier.**

Knit Goods Markets: **Distinct gain in hosiery business since Labor Day. Interest is centering in pricing of full-fashioned goods for first part of next year. Underwear outlook is called brighter than any seen since 1920. Interest in heavy-weights has made great gains. Athletic knit underwear coming to fore. Outerwear holds prominent place with continued buying of balbriggan fabric for dresses.**

Silk Markets: **Price advances are likely on broad silks as a result of the rise in raw silk. Buyers have been promoting the thought of lower prices to such a degree that sellers are hesitating to take the necessary step. Japanese market for raws is, however, forcing their hand. Rise in raws said to be devoid of speculation.**

Developing Water Powers Near New Braunfels

AUSTIN, TEX.—The Guadalupe Water Power Co., which owns the Comal river frontage and the riparian and water rights from New Braunfels, Texas, to a point five miles below Seguin, announces that it will expend some $2,500,000 in the construction of five dams at points along the river to generate some 10,000 kilowatts of electric power, which will be distributed for industrial purposes through the San Antonio Public Service Corp., owners of a 40 acre site and the Comal river power rights at New Braunfels. This will give the San Antonio Public Service Corporation something like 30,000 kilowatts when the power projects are all complete.

ATLANTA, GA.—Hillside Cotton Mills and the five other mills in the Calloway group at La Grange, Ga., are to be electrified and driven by power purchased from Columbus Electric & Power Co. Robert & Co., Atlanta, Ga., are the engineers for the mills.

Textile World Analyst

A weekly analysis and forecast by Dr. Lewis H. Haney, Director, New York University Business Research Bureau

NOTE.—The conclusions reached in the Analyst are mostly forecasts and generally apply to a time two or three months ahead. The Analyst is based on statistical data and does not reflect temporary trade sentiment.

SUMMARY — SILK

1. The statistical position of raw silk, which strengthened in July, became even stronger in August. Notably imports continued low compared with mill consumption, which suggests that stocks in this country are becoming relatively small.

2. Popularity of silk goods among consumers continues unabated. This fact, together with the strong statistical position, indicates that there can be no sustained decline in raw silk and that a continued general upward trend is likely during the remainder of the year.

3. A fuller realization of the situation may cause sharp advances in a short time. While we advise covering freely on all weak spots, we would, however, guard against following up any runaway trend.

4. The time is approaching when the effect of advances in prices on the popularity of silk should be closely watched.

Rising Trend in Raw Silk Forecast.

On its face the domestic statistical position of raw silk does not appear necessarily bullish. Stocks decreased in August for the second month in succession but this is, in part at least, usual for the season. Deliveries to mills increased slightly, making the third successive gain; but warehouse stocks are as large as usual in proportion to the deliveries, and though August imports decreased they were larger than in either 1923 or 1924.

Further study of the situation, however, indicates decided strength. Attention is called particularly to the declining trend of imports, which according to the Silk Association figures fell from 35,595 bales in July to 30,466 bales in August. Last year at this time imports were increasing. Note in Fig. 1 the relatively large area between the curve of imports and the curve of factory consumption. The imports curve has been relatively low in comparison with consumption for an unusually long period, which makes the area referred to larger than it has been in any recent year.

This situation suggests that the usual September increase in stocks of raw silk will not occur this year. At least any increase will be unusually small.

Also note the steady upward climb of the factory consumption curve. The trend of deliveries to mills is still strongly upward and reports indicate that at least sustained activity will continue throughout September.

In view of this analysis, but one conclusion is possible, namely, that raw silk prices will continue strong, with a general rising trend. If the trade now buys heavily in anticipation of advances in silk, there may even be sharp advences. ***The advice of the TEXTILE WORLD Analyst is to cover requirements for raw silk freely, but to avoid following up sharp advances.*** The reason for the qualification is that a sharp run-up in raw silk values would probably lead to increased imports and stocks which would bring a reaction in a month or two.

We look for a pause in the current upward trend of the silk market in the near future. Present indications are that following such a pause there will be a further upward trend which will carry well through the remainder of the year. Our hypothesis is that some time in the first half of next year prices will reach a level which will curtail demand and bring on a decline.

Advices from Yokohama indicate decided strength in the Japanese raw silk market. Although the cocoon crop will be larger this year than last, values show a rising trend

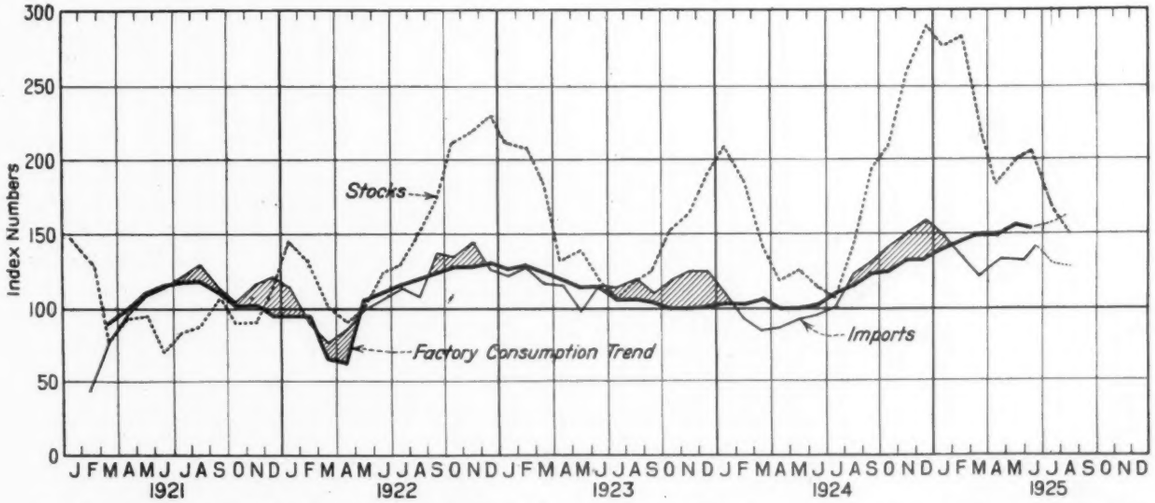
300
250
200
150
100
50
0
Index Numbers
Stocks
Factory Consumption Trend
Imports
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1921
1922
1923
1924
1925

Fig. 1. STATISTICAL POSITION OF RAW SILK—Stocks of Raw Silk, Bales in storage at end of month. Avg. 1921 = 100 (Silk Association). Imports, Pounds. Avg. 1921 = 100. Three months' moving average. (Dept. of Commerce.) Last month estimated by converting each item of Silk Association figures from bales to pounds and then applying the per cent increase to preceding month. Factory Consumption Trend, Deliveries—Bales. Avg. 1921 = 100. Five months' moving average. (Silk Association.)

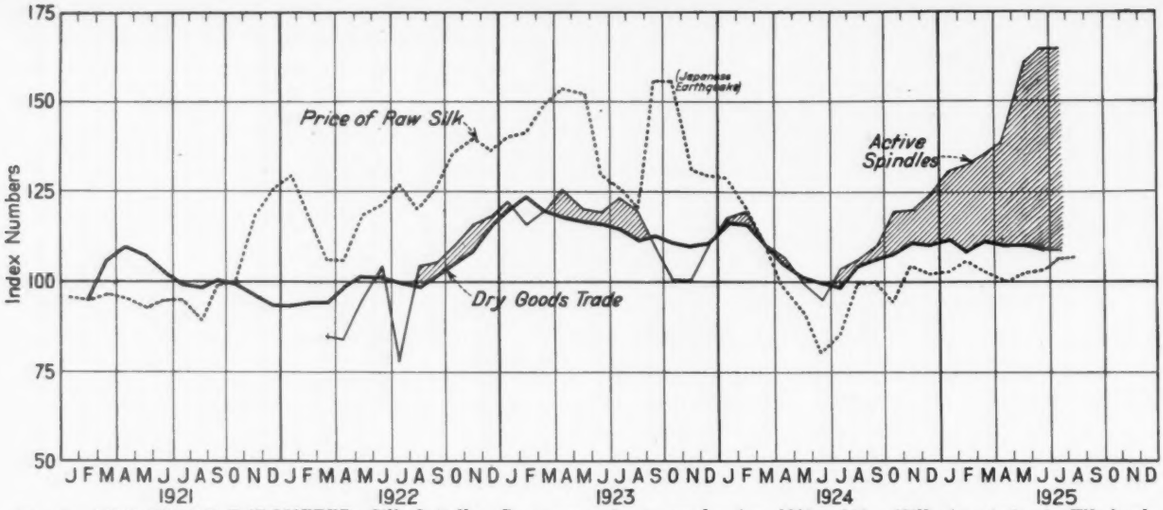
Index Numbers
175
150
125
100
75
50
Price of Raw Silk
(Japanese Earthquake)
Active Spindles
Dry Goods Trade
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
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Fig. 2. SILK TRADE BAROMETER—Silk Spindles, Per cent active to total. Avg. 1922 = 100. (Silk Association.) Wholesale Dry Goods Sales—Adjusted for seasonal variation. Avg. 1922 = 100. Three months' moving average centered. (Federal Reserve Board.) Price of Raw Silk—Kansai, Best No. 1. Average of high and low Thursday prices. Avg. 1921 = 100.

and stocks of raw silk at Yokohama have recently been decreasing. Reports indicate that such stocks have fallen from 30,000 bales in the week ending Aug. 18, to 25,600 bales in the week of Sept. 11. Despite heavy arrivals from the filatures, therefore, the outward shipments of silk are more than keeping pace.

Higher Silk Goods Prices Are Justified and Are Predicted

The outstanding fact shown in Fig. 2 is the continued record breaking level of spindle activity. There was practically no change between June and July, but the June figure was so high that the continuation shown by the July figures is somewhat of an event. All indications suggest a sustained high level of spindle activity during the fall and early winter months, but it seems probable that the peak has been nearly reached.

Meanwhile, wholesale dry goods sales, allowing for the usual seasonal variation, show mere stability. In fact, a slight downward trend is apparent between March and July. Of course, allowance must be made for the larger percentage of silk in recent sales of textiles, and for the fact that the very large hosiery business is not reflected in the wholesale dry goods trade. But even allowing for these facts it seems likely that an accumulation of silk goods is in the making, which would naturally tend to check advances in prices.

The monthly average price of raw silk has worked up gradually for three months in succession. In fact the August average was highest since March, 1924. In August the price of Kansai No. 1 averaged $6.45 against $6.43 in July. In the early part of September there has been a continued upward movement, the figure on Sept. 11 being $6.72. The advance of 30c between Aug. 21 and Sept. 11 is said to require an increase in silk cloth of between 7 and 10c a yard.

The average price of raw silk in August was nearly 8% over the same month in 1924. September prices will show an advance of something like 12%. Already there is talk of advancing silk goods about 5%. Some such advance seems justified and necessary. The only question is whether or not stocks have been accumulated by the mills at lower prices. This does not seem probable in view of the active demand, the high level of spindle activity, and large volume of the hosiery business. Probably spring requirements remain largely uncovered. ***Consequently, the rising trend of raw silk will have to be reflected in goods for the spring trade and higher prices may be expected in November.***

There seems to be no question that the demand for silk goods will be well sustained throughout the fall and winter. Indeed, favorable indications are already at hand concerning orders for next spring. The question is, will the price of silk goods be forced up by higher raw materials to a point where the demand will be curtailed? Style is a strong factor, but after all, styles are sometimes influenced by considerations of economy. The silk trade should bear in mind the possibilities of rayon mixtures, both with cotton and wool. Indications of an increased vogue for worsteds continue to appear. It will be remembered that the cheapness of silk has been one of the factors in the popularity of that material and a question arises whether or not the present cheapness of wool will help the budding movement toward worsteds.

We can not attempt to forecast the demand factor insofar as it is based upon style considerations, but ***it seems a possibility that toward the end of the year the advance in raw silk may reach a point sufficiently high to operate as a slight check on the volume of sales.***

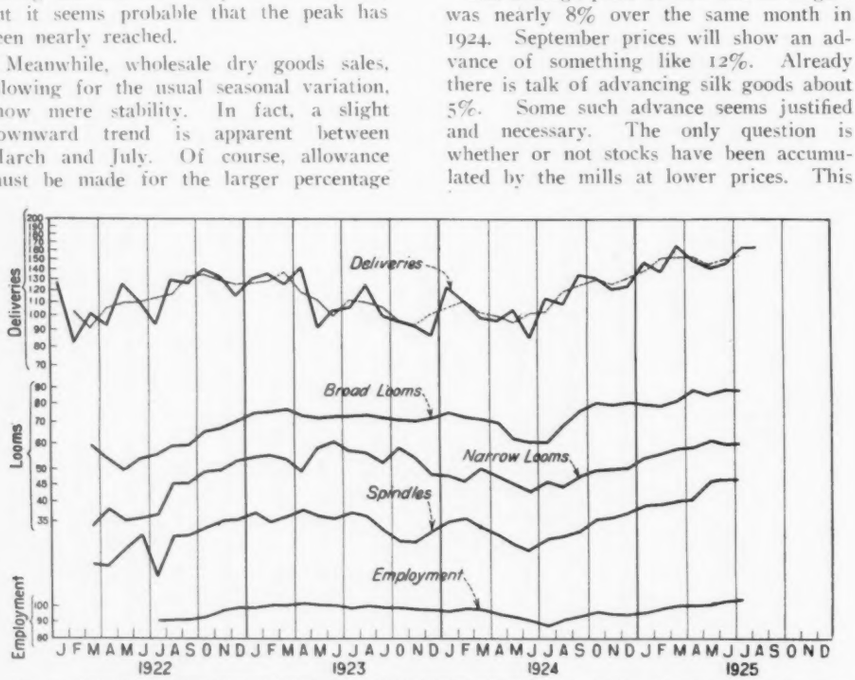

Deliveries
Looms
Employment
Deliveries
Broad Looms
Narrow Looms
Spindles
Employment
J F M A M J J A S O N D J F M A M J J A J O N D J F M A M J J A S O N D J F M A M J J A S O N D
1922
1923
1924
1925

Fig. 3. INDEXES OF ACTIVITY IN SILK MANUFACTURING—Deliveries (heavy line), same as Fig. 1 except that monthly figures are shown; (dotted line), three months' moving average as above. Broad Looms, Narrow Looms, Spindles, per cent active to total. (Silk Association.) Employment, number employed. Avg. 1923 = 100. U. S. Bureau of Labor Statistics. All of the indexes in Fig. 3 are plotted on a logarithmic scale.

Though Already High, Silk Mill Activity Likely to Show Further Gains

The only significant development revealed by the data illustrated in Fig. 3 is the general stability in activity in silk manufacture. July employment and deliveries of raw silk to the mills show increases, while the activity of looms and spindles remained practically unchanged from June. August deliveries also show little variation. ***It, therefore, seems fair to say that the silk industry is holding steady at peak levels. In view of current demand and the general outlook for improved business, some further gains are probable.***

CONDENSED TEXTILE ITEMS

Semi-Annual Meeting of S. T. A. on Oct. 16 and 17

COLUMBUS, GA.—Preliminary plans have been worked out for the semi-annual meeting of the Southern Textile Association, which will be held here on Friday and Saturday, Oct. 16 and 17.

The opening session of the meeting will be held at nine o'clock Friday morning in the auditorium of Columbus Electric & Power Co.'s service station, when the address of welcome will be given by J. Homer Dimon, mayor of Columbus. This will be followed by a business session, and in the afternoon delegates will be entertained at a rolling kitchen lunch and will witness a demonstration of infantry maneuvers by the garrison at Fort Benning, the largest infantry school in the world, which is nine miles from Columbus.

The maneuvers have been arranged for by the courtesy of Brigadier General Briant H. Wells, commandant at Fort Benning, and will be one of the chief attractions of the convention.

Friday evening delegates will be entertained with a banquet at the auditorium of the service station. Saturday morning will be devoted to a business session, and in the afternoon delegates will attend a football game between Oglethorpe University team and the soldiers' team at Fort Benning at the dedication of the new fort stadium. Facilities for golf are to be provided at the Columbus Country Club.

Oscar D. Grimes, of Athens, Ga., is president and F. Gordon Cobb, of Lancaster, S. C., is secretary and treasurer of the Southern Textile Association. Frank K. Petrea, superintendent of the Swift Mfg. Co., Columbus, is chairman of the local entertainment committee. Between 300 and 350 members of the association are expected to be present.

* * *

Marine Corps Suiting Bids Opened

PHILADELPHIA.—Sealed bids were received by the Philadelphia Quartermaster of the Marine Corps at the depot, Broad St., & Washington Ave., Sept. 10, for supplying 200,000 yds., khaki suiting. In all 16 quotations were received, several of which were upon individual samples rather than Government specifications. The following concerns submitted bids: H. W. & I. Schwab, Inc., 38c a yd., on material to be manufactured in England. Institution Equipment Co., 33.29c a yd., terms 2% 10 days. Prince, Lauten & Co., 34½c, if dyed with mineral dye and 37½c if dyed with indanthrene. Wellington, Sears & Co., bid 31.4c. Penn Supply Co., 33½c on standard specifications; 32c and 29½c on two samples submitted. Otto Goetz, 31.48c on specifications, also an alternate bid on sample of 27.98c. Turner Halsey & Co., quoted 40c, with an alternate bid on sample of 43.3c, if dyed with indanthrene dye. Lawrence & Co., 40c. George Wood Sons & Co., 32.87c, terms 1% 10 days. Parker, Wilder & Co., 30 1/19c if dyed with indanthrene and 28.4c if dyed with mineral dye.

* * *

Interpretation of Provisions of "Southern Mill Rules"

ATLANTA, GA.—Georgia cotton mill men are following the lead of the North Carolina mill men in their interpretation of Paragraph II Classification Section "d" of the Southern Mill Rules, recently adopted by Georgia as its standard mill rules.

Section "d" reads as follows:

"(d) All cotton rejected must be replaced by the shipment of the quantity of cotton rejected, within twenty days of the final decision upon arbitration as herein provided for. Should the cotton in default not be replaced, or should the cotton with which the rejections are replaced not be according to the contract in grade, staple, or character, then the buyer shall have the option either to cancel the contract, *or to replace the defective cotton at the market price, in which case the seller shall pay the difference between the market price and the contract price*, plus one-fourth of a cent per pound penalty. No second replacement shall be allowed."

In interpreting this section of the rules, the Cotton Manufacturers' Association of North Carolina has issued the following statement:

"It is the purpose and intent of this section that the words 'or to replace the defective cotton at the market price, in which case the seller shall pay the difference between the market price and the contract price' shall be construed to mean that the seller shall pay to the buyer the difference between the contract price and the market price *only in those cases where the market price of cotton is in excess of the contract price*."

Concurrence of the Georgia cotton men in this interpretation will probably mean that the interpretation quoted will be adopted by the associations in the other Southeastern States, and the situation as regards this section of the mill rules definitely cleared up.

* * *

Process Exhibits at Canadian Show

TORONTO, CANADA.—"The Autobiography of a Canadian Industry" might well be the title of the exhibit arranged by the Canadian Woolen and Knit Goods Manufacturers' Association in the Process Building at the Canadian National Exhibition at Toronto. Page by page, chapter by chapter the story of the woolen industry, from its earliest stages to the most delicately finished product, is unfolded for the information of the public and for the encouragement of Canadian patronage for Canadian woolen goods. From the raw material at one end to a splendid display of blankets, knitted goods, silk hosiery and woolen textiles at the other, there is shown between the two extremes the complicated and fascinating processes which take up the tale and give it movement and interest.

* * *

World Using More Cotton According to Federation

WASHINGTON, D. C.—World mill consumption of cotton during the six months ended July 31, 1925, is estimated at 12,000,000 bales, an increase of 22% over the corresponding period last year, by the International Federation of Master Cotton Spinners' Associations in a cable to the Department of Agriculture. The 12,000,000 bales estimate is 7% more than consumption during the half year ended Jan. 31, 1925.

World consumption of American cotton, included in these figures, is placed at 7,022,000 bales during the six months ended July 31, 1925, compared with 6,232,000 bales for the half year ended Jan. 31, 1925. Consumption of East Indian and Egyptian cotton was slightly less than the preceding six months.

World mill stocks of all growths of cotton were 4,264,000 bales on Aug. 1, 1925, or 20% more than on Aug. 1, 1924, and 9% more than on Jan. 31, 1925. Stocks of American cotton in the mills of the world increased from 1,326,000 bales on Aug. 1, 1924 to 1,815,000 bales on Aug. 1, 1925, but on the latter date showed a decrease of 22% from Jan. 31, 1925. East Indian and Egyptian mill stocks were slightly less than on Aug. 1, 1924.

* * *

Less Importation of Cottons in August

WASHINGTON, D. C.—A noticeable decline in cotton cloth imports occurred in August. Imports through the customs districts of New York, Boston, Philadelphia, Chicago and San Francisco totaled 4,239,000 sq. yds., valued at $871,000, compared with 4,044,000 sq. yds., valued at $1,129,000 in the previous month and 9,117,000 sq. yds., valued at $1,892,000 during Aug., 1924, reports the Textile Division of the Commerce Department. August imports were considerably lower than the monthly average for the first six months of the year which was 10,800,000 sq. yds. and $2,600,000. The August figure also was lower than any recorded since tabulation commenced in March, 1924.

* * *

New Contract at Liverpool for "Empire Cotton"

MANCHESTER, ENG.—The new contract for future delivery of Empire and miscellaneous cotton which was traded in on the Liverpool Cotton Exchange for the first time on Sept. 1 is confidently expected to be of great assistance in encouraging cotton growing in the British Empire. Owing to a large number of growths of cotton which can be delivered against sales of this contract, there was much difference of opinion among members as to its value in relation to American cotton, and the quoted prices range at about ½d. per lb., under American. Time alone can show its true relative value, but it is of immense protective importance to bankers who finance shipments, and to all those who grow and deal in Empire cotton.

Business under the new contract was opened by Mr. Paton, the vice president of the Liverpool Cotton Association, and he said that it may be that in the future the new contract may even supersede the American contract, and if the Liverpool Exchange members were all willing to give their support it would be a useful addition to the contracts which they already had. The first sale was made by Col. J. J. Shute of Messrs. Reynolds & Gibson and then followed a considerable trade in cotton for delivery in January at 11.05d.

* * *

Plans Steam Power Plant to Guard Against Drouth

CHARLOTTE, N. C.—An 80,000 horsepower steam electric plant is to be built by the Southern Power Co. immediately in order to create a reserve that will provide ample assurance against possibility of power curtailment because of drouth in the future. Announcement of the plans were made by C. I. Burkholder, vice president and general manager of the power company who has just returned to Charlotte from a conference with J. B. Duke at his summer home at Newport, R. I. He and W. S. Lee, chief engineer of the company were called into conference by Mr. Duke in regard to the present drouth which is badly crippling the resources of the company, and through it the entire industry of this section. Determination to build the additional steam plant was the result of the conference. The company now has steam plants in operation at Duncan, Greenville, S. C., and Mount Holly, Queensboro, and University Station, N. C. These steam plants, which are in operation day and night, are at present, because of the drouth, the company's greatest source of power.

THE PERSONAL PAGE

A. R. Heritage, president and manager of the Heritage Woolen Mills, Inc., Holliston, Mass., resigned that position, effective Sept. 8.

George S. Harris, president of the Exposition Cotton Mills, Atlanta, Ga., has just returned from a two weeks' vacation spent in the East with his family.

Benjamin B. Tilt, chairman of the board of directors of the Phoenix Silk Mfg. Co., Inc., Allentown, Pa., has been elected treasurer of the company, succeeding O. E. Stevens who has resigned. W. N. Bennett has succeeded Mr. Tilt as secretary of the Phoenix company.

The wedding of Miss Rachel Wallace, daughter of George R. Wallace, president of the Rodney Wallace Co., Fitchburg, Mass., and Chester D. Heywood, Worcester, Mass., is to take place at the home of the bride's parents on Oct. 10.

Otto W. Schaum, head of the Fletcher Works, Inc., Philadelphia, who is president of the Whitemarsh Country Club, is being congratulated by his friends upon the excellent arrangements his committee made for the "world title" golf match held on this course last week, players stating the handling of the gallery had been the most perfect they had yet encountered.

Major Stuart W. Cramer, Jr., vice-president of the Cramerton Mills, Inc., Cramerton, N. C., recently sailed for France to visit the French textile centers as the representative of the American Cotton Manufacturers Association on invitation by the American Good-Will Association, Franco-American Branch. He will return to this country about October 1 and it is expected he will report the result of his visit at the next annual meeting of the Association.

Samuel S. Fleisher, S. B. & B. W. Fleisher, Inc., and Joseph M. Steele, of Wm. Steele & Sons Co., Philadelphia, have been appointed to committees, with other prominent citizens, to direct a drive of the Sesqui-Centennial Association for $3,000,000 with which to finance the exposition to be held next year in that city.

Thornton M. Richards has resigned as vice president and director of the Westerly (R. I.) Textile Co. His successor has not yet been elected.

J. H. Grenville Gilbert, treasurer of the George H. Gilbert Mfg. Co., Ware, Mass., and Mrs. Gilbert, have returned from a European trip.

Raymond Sturges, for three years an official of the Roxbury Carpet Co., Saxonville, Mass., has resigned to accept a position in Springfield, Mass.

Wm. M. McLaurine, secretary of the Cotton Manufacturers Association of Georgia, has just returned to Atlanta from a week's vacation spent in touring South Georgia. Mr. McLaurine reports the cotton crop in that section of the state as in excellent shape. The dry and hot weather has served to hold the boll weevils in check.

John Wyckoff Mettler, general manager of the Interwoven Stocking Co., New Brunswick, N. J., and party, are touring the Pacific coast and northwestern scenic points.

W. H. Bower, agent of the Norad Mills, Inc., North Adams, Mass., and Claude Bower, superintendent of the mills, have retired from the company with which they have been connected since it took over the plant of the North Adams Mfg. Co. in March, 1924. W. H. Bower is retiring because of his advanced age and it is said that his son, Claude Bower, leaves because of poor health. The elder Mr. Bower has been in the manufacturing business for 32 years. Before coming to North Adams he was connected with the Columbia Mills, Lewiston, Me. Edward F. Williams, agent of the Warren (Mass.) Woolen Mills, has taken over the agency of the Norad Mills and Fred A. Garcelon, who has been associated with Mr. Bower, has been promoted to the superintendency.

F. A. Upham, agent for many years of the Palmer Mill of the Otis Co., cotton goods, Three Rivers, Mass., has tendered his resignation and will be succeeded by H. Stewart Redman, who has been agent of Cordis Mills, Millbury, Mass. Mr. Redman's successor will be Charles A. Tabor who has been agent for more than 20 years of the Thorndike Mass., plant of the Thorndike Co., which plant is to be sold and the company's whole product made at its West Warren Mills.

Carey E. Tharp of the Boston office of the Ludlow (Mass.) Mfg. Associates and Mrs. Tharp, who were recently married in London, England, have returned from their wedding tour through Brittany, Normandy and France and are living in Cambridge, Mass.

Lester S. Chilson, formerly with the W. W. Windle Co., Millbury, Mass., is now connected with the Merchants Wool Scouring Co., East Boston, Mass., wool scourers and carbonizers of wool, waste and noils.

Seabury B. Waring who has been in the cotton brokerage office of his father, George H. Waring, in Fall River, Mass., since completing his studies at Yale last June, has entered the office of George H. McFadden & Bro., at Waco, Texas.

J. T. (Sandy) McGregor has resigned as superintendent of the Oneida Mills of the L. Banks Holt Mfg. Co., Graham, N. C., to accept a position as agent of the Stonewall (Miss.) Cotton Mills.

B. S. Phetteplace of Greenville, S. C., will be general manager of the new plant of the Central Franklin Process Co., now under construction at Chattanooga, Tenn.

J. D. Pell, who has for several years been connected with the Gibson Mfg. Co., Concord, N. C., has resigned to become manager of the Hillcrest Silk Mill at High Point, N. C.

C. W. McSwain, who has been with the Steel Heddle Mfg. Co., Greenville, S. C., for about a year, has been appointed assistant general manager of the mills of the Victor-Monaghan Co., Greenville. A. H. Cottingham is general manager.

J. D. Murray will be resident manager of the plant of the Central Franklin Process Co., Chattanooga, Tenn., construction of which was recently begun. Mr. Murray comes from Greenville, S. C.

J. N. Badger, superintendent of Dunean Mills, Greenville, S. C., for five years, has resigned. Mr. Badger formerly was with the Victor-Monaghan Co.

Arthur Tousignant has resigned as superintendent of the Monaghan plant of the Victor-Monaghan Co., Greenville, S. C., to accept a position as assistant superintendent of the Aiken Mills, Bath, S. C., and the Seminole Mills, Clearwater, S. C., with which he was formerly connected.

John T. Tidwell has been transferred from the superintendency of the Victor plant of the Victor-Monaghan Co., at Greer, S. C., to a similar position at the Monaghan plant of the company, at Greenville, S. C., succeeding Arthur Tousignant. Mr. Tidwell was formerly with the Judson Mills in Greenville.

Donald Brigham has resigned as superintendent of Mills Nos. 1, 2 and 3 of the Pelzer (S. C.) Mfg. Co., to accept a position with the Aspinook Co., Jewett City, Conn.

M. W. Bradford has recently become superintendent of the Beaver Cotton Mills, Middleton, Ga.

It was recently reported that C. L. Howie had resigned as superintendent of the Anchor Mills Co., Huntersville, N. C., and that he had been succeeded by H. C. Jones. This was an error as Mr. Howie is still superintendent of the plant, while Mr. Jones has become carder and spinner there.

Benjamin Simmons, superintendent of the Northdale Woolen Mills, Inc., Northboro, Mass., is leaving that concern to go to a larger plant in New Hampshire.

J. Conrad Hill has accepted the position of office manager of the Brown Mfg. Co., Concord, N. C.

W. O. Fairbanks has been made head of the velvet division of the production department of Salt's Textile Mfg. Co., Bridgeport, Conn. Mr. Fairbanks was formerly connected with the Roxbury Carpet Co., Saxonville, Mass.

James Hogg, consulting engineering of Stephen Sanford & Sons, Inc., Amsterdam, N. Y., sailed Sept. 8 on a several weeks' business trip to England.

R. H. Boykin, fuel manager for North and South Carolina cotton manufacturers' associations, is expected to spend this week in Atlanta completing arrangements for the organization of a fuel department for the Cotton Manufacturers' Association of Georgia. Offices will be opened, it is expected, in the Atlanta Commercial Exchange building, next door to the suite now occupied by the secretary of the Cotton Manufacturers Association, and while the final selection of a man to have charge of the office has not yet been made, it is understood that several good managers are being considered.

W. G. Fliegel has been appointed general superintendent of the office and transportation departments of the Wuerdeman Textile Mills, Fort Plain, N. Y.

Jones Y. Pharr, who has been office manager of the Brown Mfg. Co., Concord, N. C., for several years, has resigned and accepted a position in the purchasing Department of the Cannon Mfg. Co., Kannapolis, N. C.

J. H. Bagwell, who recently resigned as superintendent of the Red Springs (N. C.) Cotton Mill Co., Inc., is now overseer of weaving in the Hoskins plant of the Chadwick-Hoskins Co., Charlotte, N. C.

E. D. Underwood has succeeded M. P. Childers as overseer of weaving for the Wennonah Cotton Mills Co., Lexington, N. C.

Charles A. Callahan has taken the position as overseer of dyeing for the Maryland Finishing Co., Memphis, Tenn. Mr. Callahan comes from Waltham, Mass.

N. H. McGuire has succeeded M. M. Horton as overseer of weaving in the Echota Cotton Mills, Calhoun, Ga.

Joseph A. Cournoyer, an overseer at the Packard Mills, Inc., Webster, Mass., and Miss Cecelia F. Murphy, an employe in the finishing room of the Hamilton Woolen Co., Southbridge, Mass., were married in St. Mary's R. C. Church, Southbridge, on Sept. 14.

Burgoyne Woolley, formerly overseer of weaving for the Neild Mfg. Corp., New Bedford, Mass., has taken a similar position with the Broad-Loom Fabrics, Inc., Central Falls, R. I.

J. E. Buchanan is now overseer of No. 2 carding in the Loray Division of the Manville Jenckes Co., Gastonia, N. C. He was formerly connected with the Maginnis Cotton Mills, New Orleans, La.

Walter Martin has taken a position as overseer of carding and spinning in the Acworth (Ga.) Mills.

George J. Burke, overseer of finishing for Canadian Woolens, Ltd., Peterboro, Ont., Canada, has severed his connections with that company.

G. V. Tallent has resigned as overseer of carding and spinning for the Red Springs (N. C.) Cotton Mill Co., Inc.

Harry Barraclough, an overseer for the Hoosac Cotton Mills, North Adams, Mass., and Miss Harriet Louise Smith of that city, were married there on Sept. 6.

At a meeting in Boston held Thursday, William Whitman, Jr., was elected president of the William Whitman Co., Inc., succeeding the late Arthur T. Bradlee

TECHNICAL SECTION

Cost Finding of Flat-Knitted Silk Fabric

How Cost Must Be Apportioned Among Various Products and Processes—Importance of Accurate Accounting Methods—Suggestions for Making Estimates on Degumming, Soaking, Winding, Warping, Knitting, Dyeing, and Finishing—Necessity of Allowing for Certain Variables—Errors Which are Commonly Made

By R. Presgrave

IN the textile field, no less than among other industries, the subject of cost finding has of recent years advanced to a position of prime importance. Rapid changes, the greater perfection and standardization of mechanical processes, energetic competition, and the desire to know are a few of the factors contributing to this development. That there has been a pronounced development is patent to all who recall the time, for instance, when a manufacturer sold his goods at what seemed the right price and then anxiously awaited the end of the year when his balance sheet would tell him how he had fared.

Cost Accounting

There is a vast difference between profit finding and cost finding, and so cost accounting has come into its own, and deservedly so. Nevertheless, it has, like most new things, tended to become somewhat of a fad, and so has carried with it a certain amount of what, for lack of a more expressive but less colloquial term, may be called "bunk," and will no doubt continue to do so as long as it can be kept obscure enough to present commercial possibilities. This is true also of many other departments of industry—the chemical side for instance, in which so often well-known, old-time compounds seek a new lease of life under some suggestively potent trade name.

That an effective cost system is very necessary is all the more reason that we should critically examine each—the homemade as well as the purchased variety. The former may err through lack of experience in the elements of cost accounting, while the latter may err through a superficial knowledge of the particular industry into which it is fitted. It is not usual that a system can be applied en bloc to any business and function perfectly, and this we believe is where many of the errors lie.

It seems that the prime object of any cost system is to show in as plain a way as possible what goods are costing at the moment—not what they cost last year, not what they might cost under certain conditions but what they cost now. Admittedly the other figures are useful and necessary in deducing costs, but they are the means and not the end. Present costs show us the direction in which we are heading, which is a very vital thing.

"Last Year's Figures"

This brings us to a common point of weakness. So often costs are based, wholly or in part, on last year's figures, fitted into a system and left for someone in the office to handle. It is comparatively easy to work out and analyze the costs over a certain period and say: "Over such a time our credit losses represented 0.926% of our gross cost," or "our direct labor amounted to 24.81% of the factory cost." As we have said, these things are useful as a means to assist in figuring costs; but they are static, while a cost system should be dynamic.

A cost system should be as simple as possible, commensurate with the information required of it. And this also is where some systems fail. Frequently installed by experts with an eye to the immediate cash return, they are trusted implicity by a firm which hires people to look after them. Complacent in the thought that it has an efficient cost system, the firm spends good money to operate something that is often cumbersome, inelastic and misleading. Certainly a system should be complete enough in detail to give us all the necessary information, but never so elaborate as to bewilder. A grain of common sense is worth a multitude of red lines and high-sounding captions.

Apportioning Costs

One very important phase of cost finding that sometimes does not receive as much consideration as it should, is the correct apportioning of costs among various products of a similar nature. It is particularly essential where conditions frequently change that the actual cost of each operation upon each article be known, otherwise any sudden change in the proportions of the different articles manufactured could quite easily lead to a financial loss.

For instance, in the case of silk goods, it is not enough to divide the money spent on warping by the total weight of the silk warped over a given period, and from this deduce that all warping costs so much per pound. It would indeed be true for certain general purposes, but might be distinctly misleading under different conditions. Moreover, it would be quite possible to discover that warping over another period might have cost less per pound and actually have been more expensive, which sounds paradoxical but is true nevertheless. It hangs on the size of the yarn and will be taken up more in detail later.

The idea should be consistently in mind, however, that the costs of each article must be so correctly apportioned that, should the plant run almost entirely on that article for a time, they would remain unchanged. It is a matter of more or less common experience to find that selling prices on a certain thing have been so incorrectly estimated that a sudden run on that article leads to an operating loss before it can be detected that profits on the other articles have been compensating for a loss on the article in question. This is, of course, entirely apart from the now quite common instance of knowingly selling goods at a low price for special reasons.

Room for Error

From these preceding remarks it will be plainly seen that cost finding reduces itself to correctly estimating the cost of each component in the total cost. Here, also, is room for error; for every item must be correct, or the total will be incorrect and the care spent on other items more or less wasted. That a chain is no stronger than its weakest link is particularly applicable to cost finding, more so indeed than in the mechanical details of manufacture where errors can give a result, inferior perhaps, but not basically incorrect in the same sense.

In keeping with the foregoing, no attempt will be made here to set forth any absolute and complete method for figuring the costs of real silk tricot and milanese fabrics, but rather to note some of the places where error can creep in unnoticed and to make a few suggestions, some of which might well be applied to other fabrics and textile materials. The production cost only will be considered, the marketing being generally a straightforward matter of distributing the sales cost and general overhead in direct proportion to the production cost. Obviously enough, the factory cost for each article must be correct or else the marketing cost will be wrongly applied. With this in mind, the various components of the production cost will be examined with the idea of discovering how best to arrive at each of them.

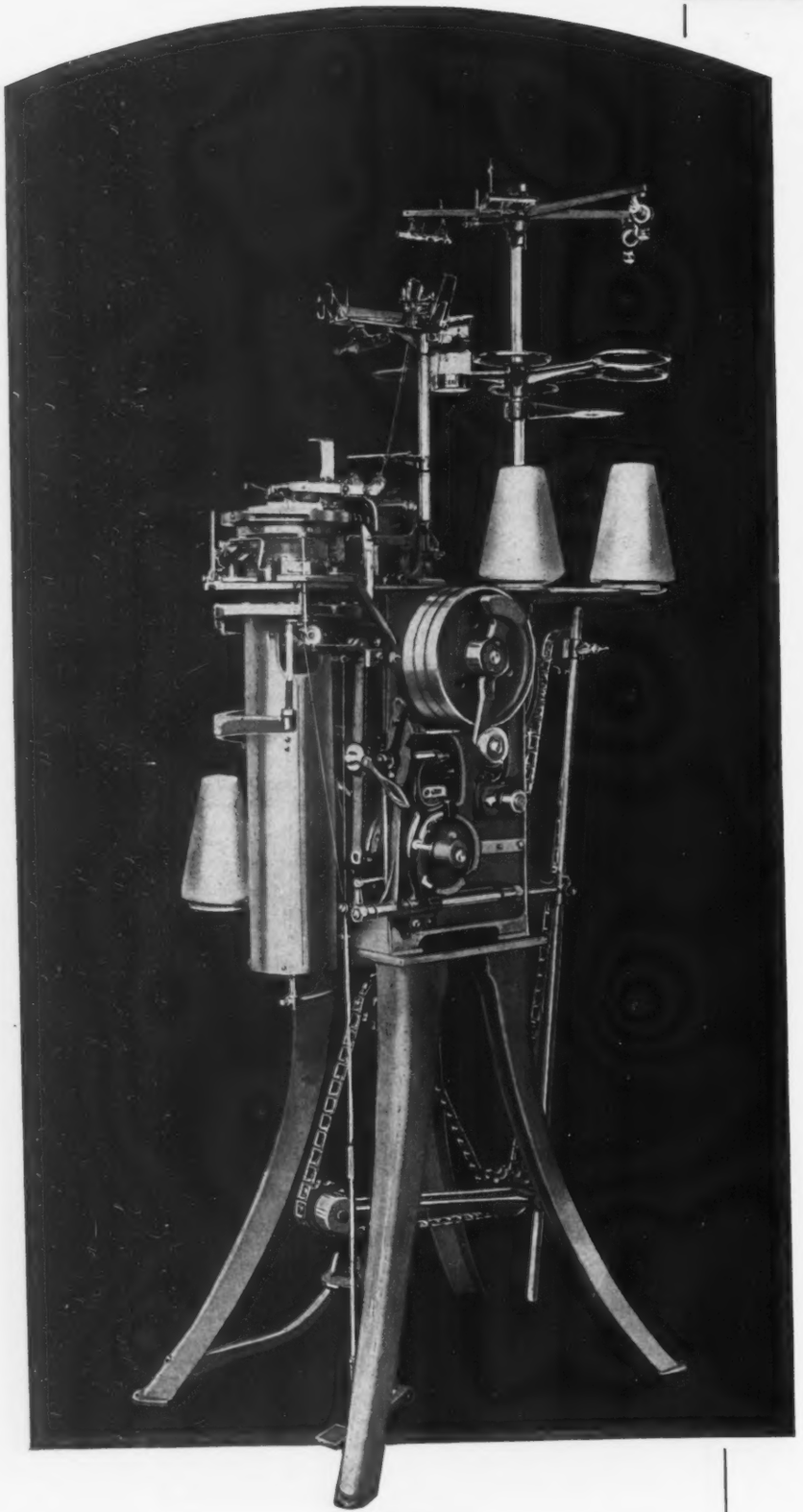
Gum Content

Before going into details, there are one or two properties attaching to silk itself that should be taken into consideration, although this is frequently not done, at least not as thoroughly as it might be. The first of these is the matter of the gum content of silk. As everyone knows, all silks in the raw state contain the natural gum, sericin. This gum removed by boiling with suitable detergents, has been found to vary in amount with different types of silk. For instance, a white Japanese silk may contain no more than 20% of gum, while a yellow Japanese may run as high as 25% in gum, with the various Chinese and Italian silks generally coming between or around these. Obviously, this matter of gum content is very important; for the gum costs exactly as much as the silk fibre, and ends up in the sewer—a total loss. Yet many mills, figuring other costs with minute exactness, arbitrarily call their boil-off 25% for all grades of yarn and let it go at that. Fortunately, this error is generally on the right side as far as profits are concerned, for few silks in common use have a boil-off as high as 25%.

Nevertheless, for accurate figuring it is advisable to discover the true average boil-off for each particular type of yarn in use. We say average boil-off advisedly, for there may be slight variations in gum percentage even within a specific grade of yarn. These, however, tend to balance themselves in the course of time and give a true average. The boil-off percentage can be ascertained by sampling each bale and applying the customary analytical methods, or it can also be found by checking incoming raw silk against the finished weight of cloth produced over a given period of reasonable length, taking due notice, of course, of stock in hand at either end of the period.

Waste Yarn Included

This last method recommends itself from a practical standpoint, but it should not be overlooked that by it the yarn actually wasted in operating is actually included as part of the boil-off. However, it is quite ex-



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gredient in cost finding to thus include the waste, providing due cognizance is taken of the fact. Entirely apart from this, however, the amount of waste should be carefully estimated by preserving and weighing it, for only by so doing can a check be kept and loss held at a minimum.

In addition to this, it is found that the size of the silk itself varies from standard from bale to bale. This also is self-compensating and does not need to give concern. The matters of variation in size, boil-off, etc., as well as many other things that have a bearing on the present article, are more fully discussed in two previous articles on tentering and finished weight respectively. (TEXTILE WORLD, April 25 and June 20, 1925.)

In practice, it is common to place a set figure on waste, such as 5c for each original pound of yarn. This is not a very good method, as waste loss must naturally vary with the price of raw silk. It is such a very small amount, however, when reduced to yards of fabric, that the method of figuring it is not very important.

Oil and Soap

A point that is sometimes overlooked, particularly in the silk woven in the gum, is the fact that after the customary soaking prior to winding the yarn weighs considerably more than previously. This, of course, is due to the absorption of oil, soap and so on into the fibre and should be properly estimated and taken into account. For instance, it might be found that a warp weighing 100 lbs. would give in the end only 68 lbs. of finished cloth. On the face of it, it would appear then that the boil-off of gum amounted to 32%, while actually perhaps only 23% would be gum and the remaining 9% would be oil.

The amount of oil thus taken up will depend largely upon local practice, but it should be estimated as closely as possible and allowances made, otherwise certain costs pertaining to silk in the gum, winding and warping costs particularly, will appear too low. Obviously, a certain length of yarn weighing 10 lbs. would take just as long to wind as the same length of yarn weighing 11 lbs. but containing 1 lb. of oil. Yet the latter would appear to cost less per lb. to wind. This is further taken up under the section given over to winding.

Moisture Content

That silk is hygroscopic should not be overlooked. The only way to overcome this is to finish and weigh the cloth under constant standard conditions so that the moisture content may be as uniform as possible. This point is not often very serious in practice, but it opens a wide field of discussion in regard to which the reader is referred to the literature dealing with silk conditioning.

A situation that affects the costs at almost every stage is the unavoidable division of the fabrics in question into two classes apart from their construction. In one the gum remains in the yarn until after weaving while in the other the gum is removed prior to winding. This does not greatly affect actual costs, but it has considerable bearing on the way they are figured, and will be taken up as it concerns each operation. No account will be taken here of those more or less uncommon cases in which the gum is only partially removed.

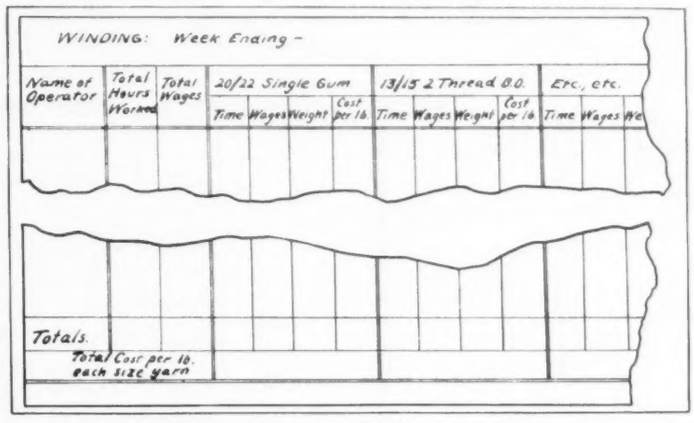

Fig. 1. Winding Form for Establishing Ratio Between Rates

The Raw Material

The first item of cost to be considered is that of the raw material itself. This presents no difficulty, as we have the straight invoice price. Transportation and such incidental expenses may be added to this or may be included in the factory overhead. Either is satisfactory, but care should be taken to see that there is no overlapping by failure to separate the smaller items from other similar expenses as they occur. It is an error, by no means uncommon, to add transportation to the cost of some article at the same time including the same item in the overhead by omitting to segregate it from the petty cash, for instance. Since raw silk prices fluctuate considerably and often quite rapidly, it is well to devise a method whereby any change in the yarn cost can be translated into the correct corresponding change in the cost per square yard. This is taken up later.

Referring to the division previously mentioned, it should be noted that the yarns which are woven in the gum are single threads, while those degummed before weaving are thrown silks, usually being trams of not more than three threads. This brings us to the item of throwing. As most mills have this work done by commission throwsters, this cost is a simple matter of invoice prices, etc., as in the case of raw yarn. Where throwing is an operation in the mill itself, a system of cost finding would have to be employed similar to that which will be outlined for other operations.

Costs Compared

Following throwing, the yarn is degummed in the skein, after which it is hydro-extracted, straightened out, and dried. It is then ready for winding. The single yarn, not being boiled-off before winding, is soaked overnight in a suitable aqueous suspension of oil soap and so on as previously mentioned. This serves to soften and lubricate the yarn, making it easier to handle. The costs of both this process and that of degumming are further taken up under dyehouse costs. The operations following these preliminary processes are quite similar for each type of yarn, so that it would probably be as well to compare the costs thus far. Here, as in other cases, purely fictitious costs will be used. It is not possible to give any more than very approximate figures, as they would naturally vary considerably with local conditions.

Considering tram silk, let us put the cost of raw yarn at $7 per lb., throwing at 70c and boil-off at 12c. Then we have a total cost per lb. of $7.82, based on the raw weight. Here it must be remembered that, after boiling-off, the silk weighs considerably less. Let us for convenience place the boil-off at the conventional 25%. Then we have for every pound of the original yarn only three-quarters of a pound of boiled-off yarn costing $7.82. Thus the yarn in its boiled-off state has a cost of $7.82 x 4/3, or $10.43 per lb.

Turning to the single yarn and putting the cost of soaking at 4c, we find that this yarn ready for winding would have a cost of $7.04 per lb., ignoring the additional weight of absorbed oil and so on. Methods for calculating the costs of the two types of cloth depend upon properly recognizing these two figures.

Winding Cost

Continuing we find that there are three general methods by which winding is paid for. The first and perhaps the simplest from a cost standpoint is the piecework rate of so much per lb. Properly arranged, this method can be made to give an accurate cost for winding each type of yarn, but allowance should be made for the weight of oil absorbed, the different sizes, and whether or not the silk is boiled-off. Another method in less common use is that of paying so much per swift for each swift kept in continuous operation. This may be satisfactory in some respects, but it is not a very good basis on which to distribute costs. The third method in use is that of straight time work which also has its advantages and disadvantages.

The choice of the method of paying help is governed by preferences or conditions, but any one of the above systems can be made to yield the correct cost of each size of yarn. This is an essential point in the cost finding of winding on a weight basis, yet many mills establish one set price per pound for winding all sizes. That this is incorrect is obvious.

For instance, one pound of 20/22 yarn, being 50% larger in size than 13/15, can thus contain only two-thirds the length of yarn contained in one pound of the latter. Hence the cost for winding 20/22 would be one-third less per pound than for 13/15, other conditions being equal. However, conditions are not always equal, for a lightweight yarn generally gives more trouble in winding than does one of heavier weight, thus adding still more to the time taken and consequently to the expense. Hence, the necessity, as mentioned, of finding out the correct winding cost of each kind and size of yarn in use.

Yarn Size Allowance

If this is done by the piece-work method, a proper ratio between the different rates, according to the size of yarn, should be maintained. To establish this ratio, the accompanying form is suggested (Fig. 1). This form can also be applied to the other two methods for winding outlined. It is quite simple, yet should provide all the information necessary, subject to modification by local conditions. The form should preferably be filled in at least every week in order that a constant check can be kept. In this way, it will give concisely the winding cost per pound for each type of silk and for each or all operators on that type.

The employe in charge of winding may fill in the columns given over to time and weight, the wages and calculations being filled in in the office. We would suggest not having the silk sizes printed in as is the custom, but rather filled in by hand as occasion demands. In this way fewer columns are necessary, as it is hardly likely that all possible varieties of silk would be wound each week. At the same time, also, the form thus becomes more elastic, as any unusual yarn can be accounted for along with the commoner types, and the form is not limited to silk yarns only.

Oil Absorbed

Mention has been made of the absorption of oil by silks wound in the gum. Account must be taken of this in establishing winding costs (also warping costs). According to the form, the winding cost of gum silks will cover this oil content. Thus, the obvious thing in finding the cost of a fabric would be to use this price coupled with the weight of the cloth after knitting. It is quite possible for this to be incorrect, for it is often

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the custom to paint the warps during knitting with some oily emulsion to assist the process. In this way considerable weight could be added to the cloth over and above that added in the original soaking of the yarn. This would tend to make the theoretical warping and winding costs unnecessarily high in this particular instance.

There would appear to be only one way to overcome this difficulty properly, and that is to determine the actual amount of oil absorbed and adjust the winding cost to agree with it. Let us take an example to elucidate this. Suppose that 8% is found to be added to the yarn in soaking. Then, for every 100 lbs. of yarn treated, we have 108 lbs. to wind. If this winding costs altogether $12, the apparent cost per pound would be $12/108 or 11.11c. Actually, however, only 100 lbs. are wound at a cost of $12/100, or 12c per lb., which is the same as 11.11 x 108/100.

A Common Error

Thus, to find the correct winding cost of silk in the gum, we must multiply the apparent cost by unity plus the percentage added to the weight by the oil. The distinction should also be made between percentage of weight added and contained percentage. For instance, if, starting with 100 lbs. of yarn, we finish with 110 lbs., this plainly represents an addition to the weight of 10%. But, on the other hand, the yarn as it stands contains only 9.09% of oil by weight. This distinction is not always made, so that erroneous results are obtained that may appear quite correct on the face of things, and are often quite as difficult to locate, even if suspected.

If the yarn allotted to each operator could be weighed before soaking, payment could be made on the basis of this weight and the calculations just outlined could be eliminated. This, however, is not usually practicable and could not but lead to argument and unnecessary work. Nor could it very well be applied to boiled-off silk; so that, in using it, the system would lack uniformity, which is a very desirable feature from both office and mill standpoints. So the method outlined properly used with the form should give all the figures required as accurately as necessary without undue complications.

It is quite simple to estimate the amount of oil absorbed by weighing batches of skeins before and after soaking, taking care in the latter case that they are as dry as when wound. If, as is often the custom, the silk is wound more or less moist, due allowance must be made for the water content along the same lines as outlined for the oil content.

Use of Warping Records

An alternate method of discovering the percentage of oil is by using the warping records. Knowing the size of the silk, the number of threads and the length of the warp, it is an easy matter to calculate the theoretical weight of the warp, which, deducted from the actual weight, would give the oil content. Either method is satisfactory, but tests should be made of each from time to time so that a fair average can be arrived at, counterbalancing any variations in the oil absorbed.

In the second method there is also liability to error by reason of variations in the size of the silk. A number of these errors would be self-compensating. Subject to the same error again, the second method is also very useful in finding the percentage of gum in the silk. The theoretical original weight of a warp of degummed silk can be calculated as indicated above. Deducting from this the actual boiled-off weight, we have the percentage of boil-off. In this case, also, a single example might prove misleading.

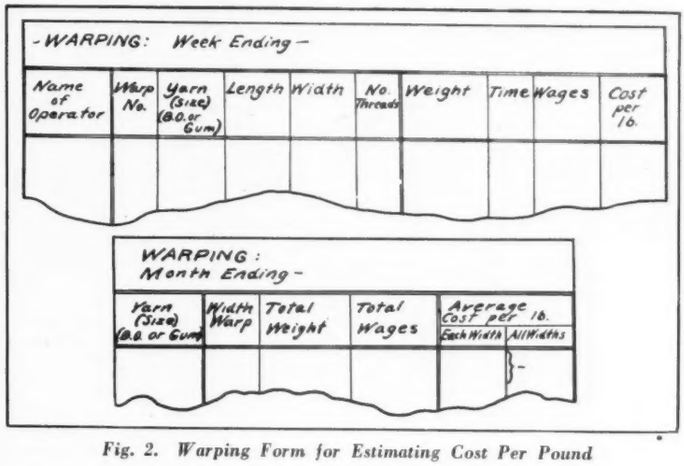


Fig. 2. Warping Form for Estimating Cost Per Pound

Warping

Warping, the operation following winding, is similar to it in some respects, so that many of the preceding remarks can be applied to it also, as will be noted. There are several means of arriving at warping wages. Piece rates based on length and width can be employed, but when various widths of knitting machines are operated with varying warp lengths, this method is apt to become involved, especially when one considers that the results must be translated to a weight basis in order to conform to other costs.

Piece rates at so much per pound are not altogether practicable, partly on account of the different sizes in silk as in the case of winding, but particularly because the width and length of the warps also have an effect on the cost entirely outside of the weight. This is especially true of the width. A warp 180 in. wide certainly would weigh 50% more than one the same length but only 120 in. wide. Yet, obviously, it would not take 50% more time to warp it; for, though the running-on might probably take 50% longer, the beaming-off would take just about the same time in each case. Thus, the wider the warp, the less it costs per pound to make it, other things being equal. Moreover, there is a further reduction in that the set costs of setting up the creel, picking up the ends and so on, would be distributed over a greater amount of silk in the case of the wider warp.

Another item to be considered in warping is the number of threads. This, of course, depends upon the gauge of the subsequent knitting. As this is usually the same for all machines in a mill, it is not of great consequence. Where different gauge machines are used, the problem is merely one of keeping separate records and costs for each gauge. No mention will be made here of any but plain fabrics. The fancy varieties in which threads are omitted and so on are so diversified that individual methods must be worked out. This should not be difficult, as the fundamentals are the same.

Time and Weight Basis

Probably the most reasonable method of estimating warping costs would be on a straight time and weight basis as outlined for winding. A suggested form is shown in Fig. 2. Here all the details but wages and cost per pound could be filled in by the one in charge of warping, these two items being filled in in the office. This form gives the cost per pound per operator for each warp. There seems to be no necessity to fill in any totals. Averages would have to be taken to secure the total cost per pound for each type of warp or for each type of silk.

If so desired, this could be filled in on a separate sheet very similar to that suggested for winding. A form for this is also included which could be filled in as a monthly digest of warping costs. The various sizes should be grouped to aid in obtaining the averages in the final column. Any forms suggested are not intended to be anything but supplemental to the usual factory records of work, time and wages, although they may be elaborated to include these functions also. Nor are the forms intended as final, but merely as embodying hints along certain lines.

It is readily seen that warping may be more complicated in cost finding than winding; for, in addition to the difficulties in the matter of the size of yarn, gum and oil content, etc., there is also the difficulty of having varying prices for each size of silk due to varying machine widths and warp lengths. Manifestly, the ideal thing would be to make all warps the same length and make each type of cloth on one width of machine only. This is not always possible in practice, and hence the best thing to do is to carefully find the cost for each width and length and from this obtain a fair average commensurate with the proportion of the various sized warps.

Care should be taken in this; for, to take the warping cost per pound from a wide warp, and then to make the cloth in question on a narrow machine, would lead to low figures. In this respect the reader is referred to subsequent remarks dealing with weaving costs in different widths. Apart from this, warping should be treated the same as winding from a cost standpoint, even to making the same allowances for oil in the case of silks in the gum. If so desired, separate warping costs can be figured for milanese fabrics. This may be quite necessary in some cases, and in any event the information might not come amiss. Methods would be identical with those for tricot fabrics.

This article will be concluded in another issue. Remaining discussions include knitting or "weaving" costs, dyeing and finishing calculations, overhead, illustrative examples, etc.

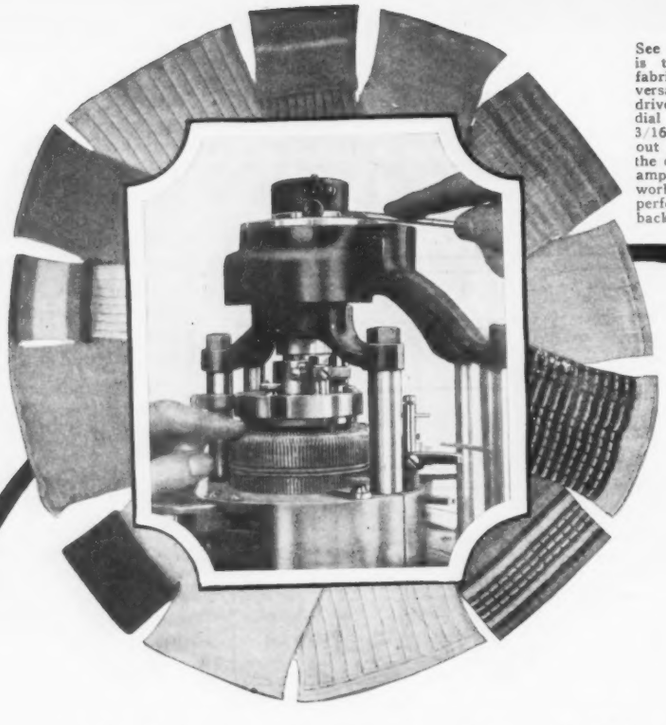
Dyeing Rayon in Hosiery

Problems of Level Dyeing and Good Penetration in Combination with Cotton, Wool and Silk

THE complexities which have been introduced into the knitting trade and the manufacture of hosiery during the last few years have made the dyer's position one of considerable difficulty. Where only one fibre has to be dealt with, the work is simple and straightforward, as, for instance, in dyeing all-cotton goods or all-wool goods. Then the dyeing operation simply follows the usual procedure for the dyeing of that particular fibre. Trade requirements, however, demand that combinations of various fibres shall be used.

As pointed out by H. B. Wolstenholme in a recent address before the Leicester Section of Foremen Dyers' Guild, the dyeing of rayon in combination with cotton and with wool constitutes one of the most important branches of the hosiery dyeing trade at the present time. Considerable care must be taken to insure obtaining the best results as to shade, level dyeing and good penetration, and also, which is very important, the keeping down of damages to the minimum. To obtain the best results several important factors must be carefully studied.

First, the choice of the most suitable machine and the handling of the



See how easy it is to "pick up" fabric on a Universal. The screw driver raises the dial cap a full 3/16 inch — without adjustment of the dial—and gives ample space to work and registers perfectly when back in position.

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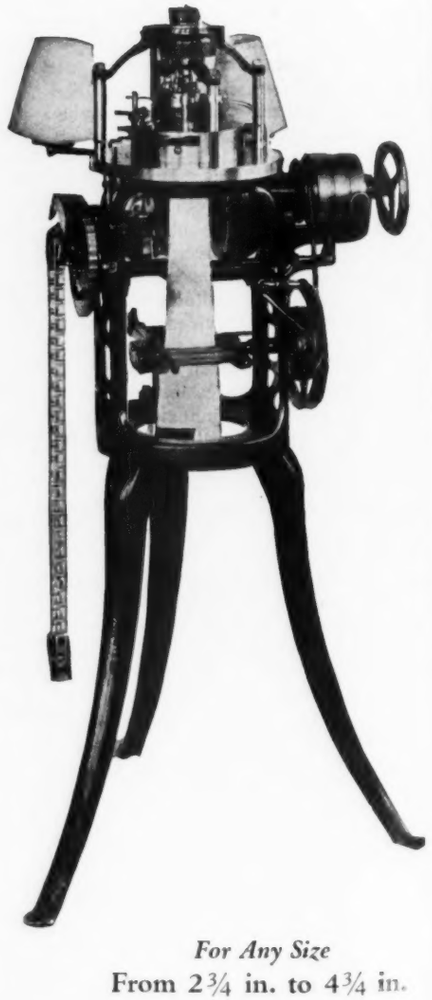
YEARS ago Benjamin Franklin said, "Save the Pence and the Pounds will take care of themselves." That is true in manufacturing hosiery today—save pennies in production costs and dollars of profit will follow.

Just think—on hosiery production of $1,000,000 a saving of 1% in production cost means the same to you (in profit) as an additional volume of $125,000, figuring the large net profit of 8 per cent.



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Every part and every motion of the Universal Ribber reduces cost. For example, the dogless has no vibrating parts—repairs and delays are eliminated. "Picking up" is made easy by the free vertical movement of the dial, found in no other ribber. To inspect an ***entire section*** of the dial simply loosen the thumb screw. A loose course plate that reduces needle breakage. Heads are interchangeable without new dogless parts. Take up gears entirely enclosed prevent oil spots and seconds. One piece frame increases rigidity. The Universal operates with less noise, less vibration and less attention, cuts down waste and irregulars and best of all cuts production costs.

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hose in a manner best suited to the particular machine chosen.

Secondly, by the careful selection of the best levelling dyestuffs, and the using of those dyestuffs in combination whose rate of exhaustion is similar.

Adapt Method to Machine

As regards machines, there does not appear to be any outstanding superiority between the machines in general use, it being far more important to adapt the best method of working to the machine already in use. This can be done by the regulation of speed in rotary and paddle machine, and in the way the hosiery is tacked up or put into nets, as the occasion demands.

The open bath method is really only suitable for small lots; and unless great care is taken in the handling of the goods, damage will be caused and also the hosiery will become tangled. On the other hand, carefully worked by experienced men, very level results can be obtained. In this method the goods can be entered either loose or tacked in singles, toe to welt, or in bundles of two or three pairs tacked toe to welt. For bulk dyeing, something better than this system is essential.

The dyepan with the blades of paddle extending across the whole machine is more gentle in its action, and possibly, therefore, more suitable for artificial silk hose. The rotary machine is very suitable for dyeing the hose in nets, and if the most suitable conditions are found as to the number of revolutions, and the quantity of hose per net be found, good results can be obtained. It is worthy of notice that a shorter liquor can be used in this machine, this giving a saving in both time and steam.

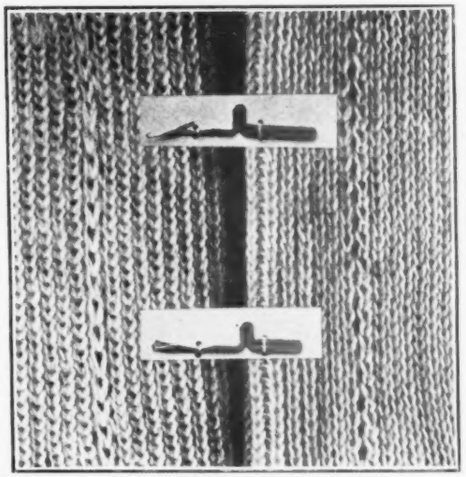
Dyeing Processes

Providing the goods are in fairly good condition—that is, free from oil—dyeing is best done without scouring, entering the goods at the boil. This, of course, is against all text book principles, as one is always recommended to enter cool and bring up to the boil over a certain length of time. Hosiery dyeing, however, is a trade to itself, and demands its own rules and regulations. By entering at the boil without scouring, better penetration is obtained at the heels and seams, as with scoured goods the liquor left in the heels and seams from the scouring or washing operation takes some time before it is replaced by the dye liquor, by which time, in light shades, the dyebath may be nearing exhaustion, and once the heels of the hose are not struck it may give considerable trouble to get over the difficulty.

In the dyeing of light shades a small quantity of alkali is advisable and little or no glauber's salt. Turkey red oil is also a useful addition to the dyebath, particularly in the case of the rotary machine, as here the turkey red oil not only acts as a retarder of the dyeing operation, but also as a lubricant for the hose and prevents,

(Continued on page 59)

DEFECTS IN KNIT FABRICS



The accompanying photograph illustrates the fourth of a series of brief discussions on knitting defects being published in TEXTILE WORLD. This defect is on a rib fabric, and is caused by a tuck stitch on one dial needle. At the right of the photograph, the outside of the fabric is shown; while, at the left, the inside of the same fabric appears. On the outside, this defect is not very apparent unless the fabric is stretched to separate the wales. The cause of this trouble was a bent dial needle, a photograph of which is inserted. The needle was bent down and to the right a little in the machine, so that the loop on it did not get the same tension that one on a straight needle did. In addition to this, the bending had caused the latch to be stiff—not too stiff to work if forced, but stiff enough to resist the yarn action unless the tension was normal or greater. This needle worked very regularly, as it tucked on every other course continually and knitted off the two loops on the other courses. Another needle which caused a similar trouble is the lower one in the photograph. This needle has the tip of the latch slightly bent upwards, causing a burr at the end of the latch spoon. This burr apparently held the loop for one course and then the tension on the next course was enough greater to cause the second course to knit off over the burr.

Knitting Seamless Hose

Correct Counts of Yarn for Machines—Winding—Measuring Hose—Weight Per Dozen

CONSIDERABLE data often required by knitters of seamless hose is presented by W. E. Boswell in a recent issue of *The Textile Recorder*. Questions sometimes arise as to suitable yarn counts, correct length and weight of hose, and the best methods for winding and lubricating. Some excellent information on these matters is included in the following abstracts.

Hose and half-hose are usually dealt with on a basis of weight per dozen pairs and in an endeavor to obtain a certain weight, counts of yarn unsuitable for the gauge of the machine are sometimes worked. Many faults in the finished garment, abnormal waste, excessive breakage of needles and reduced output may be traced to this practice. A seamless automatic hose machine has a distinct limit to the number of varying counts it will efficiently work. The best counts for a machine may be ascertained by testing a few at normal tensions and examining the resultant fabrics. The following table indicates suitable counts for gauges:—

Needles per inch	Suitable counts: Cotton	Worsted	Artificial silk
8	3/13's	2/12's	.....
9	3/16's	2/16's	.....
10	2/12's	2/18's	.....
11	2/14's	2/21's	.....
12	2/17's	2/26's	550 den.
13	2/20's	2/30's	500 den.
14	2/24's	2/36's	450 den.
15	2/28's	1/21's	400 den.
16	2/32's	1/24's	350 den.
17	2/34's	1/24's	300 den.
18	1/19's	1/26's	280 den.
19	1/22's	1/32's	250 den.
20	1/24's	1/36's	220 den.
21	1/30's	1/45's	175 den.

To find needles per inch, multiply diameter by 3-1/7 and divide total number of needles by the result.

Ex.:—166 needles, 3½ in. diameter

$$\frac{7 \times 22}{2 \times 7} = 11$$

$166 \div 11 = 15$ needles per inch.

Machines will work other counts near to those given and by adjusting the stitch cam will give a fair fabric. If, however, the yarn worked is too heavy or too fine, trouble will invariably result. The above table applies to plain hose machines. Rib machines, it will be found, will differ slightly in the counts used, as two sets of needles are employed and the "yarn space" is quite different.

Winding

Before being knitted into fabric, the yarn should be wound, either on bobbins or cones. Sufficient care is not usually given to winding, and winders often tie the same kind of knot for cotton, worsted and silk. A little experiment will show that a knot quite suitable for a cotton yarn is unsuitable for artificial silk, and so on. If more attention were given to the tying of knots much benefit would accrue in the later stages of manufacture.

Most winding machines are fitted with adjustable thread clearers which should be so adjusted that thick places and unwieldy knots in the yarn will not pass through. The winder may have widely varying thicknesses of yarn to wind in one day and should alter the thread clearers to suit the yarn being wound. The tension on the yarn during delivery to the bobbin is very important and should the winder neglect to alter the tension when changing from a fine to a coarse yarn, loosely wound bobbins result.

When the yarn is being drawn rapidly off the bobbin by the machine several strands may be pulled up together, causing the machine to stop suddenly with disastrous results to the needles.

Some yarns require damping, and this is usually done during the winding operation. The object of damping is to make the yarn pliable and thus assist in more perfect loop formation in knitting. Woolen yarns may be damped with a solution made up as follows: Dissolve one pound of white curd soap in one gallon of boiling distilled water, allow the solution to become luke warm, and add half a pint of good yarn oil. Stir until the oil forms an emulsification with the soap. The solution, or "lather," is usually poured into a trough, the latter being carried on the winding machine. A roller, revolving in the trough carries round with it a thin layer of lather, the trough being only half-filled. The yarn passes over the roller on its way to the bobbin and thus receives its lubrication. Different classes of yarn require varying amounts of moisture. Coarse worsteds require a large amount of damping and medium quality worsteds require more moderate damping.

Amount of Lubrication

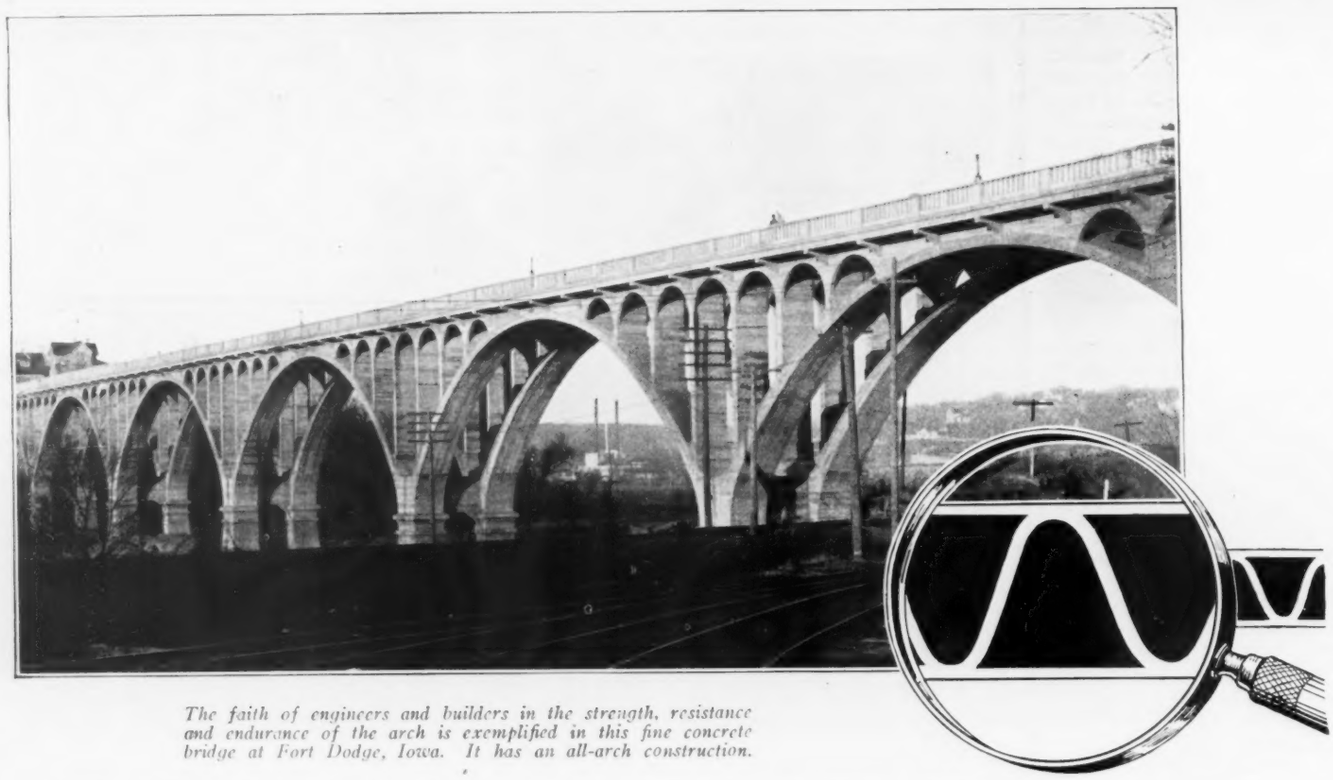
The construction of the yarn must be the guide to the amount of moisture given. The varying of the moisture should be thoroughly understood by the winder. It may be varied by altering the speed at which the roller revolves. Most rollers have three driving wheels, each giving a different speed to the roller, and advantage of these should be taken, thus regulating the amount of moisture taken up by the rollers.

It is advisable to work up damped yarn a few hours after winding, or, the lather becoming dry, the yarn will stick and will be harder to pull off the bobbin, thus affecting the tension at which the yarn is delivered to the machine needles.

This often explains the varying length of hose, the extra strain on the yarn causing the fibres to become stretched beyond normal during loop formation, contraction taking place as the hose comes off the machine.

Artificial silk is largely used in the manufacture of seamless hose, and this class of yarn must be carefully treated when being wound from hank to bobbin. Artificial silk yarn is made up of a number of filaments and if the yarn is unduly jerked during winding a fracture of one or more filaments may occur and will show in the finished hose as a hairy or frayed mark. A great deal of trouble has lately been given to the method of

(Continued on page 61)



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The functions of an arch are to neutralize shocks, strains and vibrations. In so doing, it becomes a support and protection. Whether used in a bridge or in a Mid-West corrugated shipping box—its functions are the same.

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NEW MACHINERY AND PROCESSES

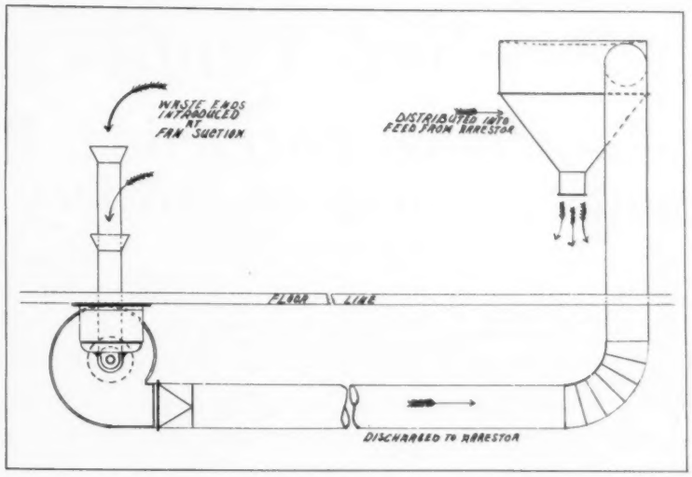
Returning Card Waste

Ends Broken Up Into Loose Fibre —Returned to Feed

A system for returning the waste ends on a woolen card to the feed in an open and fluffy condition has recently been developed by the E. H. Allen Co., 22 Dorrance St., Boston, Mass. The waste ends are delivered to the feed in their original condition, without altering the nature of the mix or causing a shady yarn of ununiform weight.

The accompanying diagram shows the arrangement of the equipment. The waste ends enter the system at the left of the illustration, are broken up into loose fibre by a directional draft of air in the suction pipe, and pass directly to the fan. They are then blown by means of the fan to the arrestor. From here they are dopped into the automatic feed.

Each card is equipped with a separate unit. The exhauster is located either on the floor at the card or on the ceiling below, and is driven from the main card drive or by a separate motor. The pipes through which the waste ends are fed run through the floor at each side of the card to the inlet of the exhauster, or along the floor to the exhauster. The exhauster has a new type casing and wheel which permits the opened stock to pass through with absolutely no injury to the fibre. During its passage through the discharge pipe and arrestor, the waste and stock is continually being opened up, and when discharged into the feed from the arrestor, is in the original picked condition. This equipment is said to be inexpensive to install; and to require little power.



E. H. Allen Equipment for Returning Waste Ends on Card

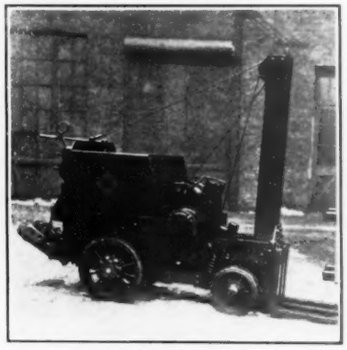
Elevator Truck

Fork Raises Load from Floor— —Four Wheels Steer

An elevator truck recently designed by The Elwell-Parker Electric Co., Cleveland, Ohio, and originally intended for the handling of tin plate, is now being adapted to the handling of a wide variety of articles, including bales, barrels, boxes and bags. The new unit is driven by an electric motor, which receives its power from a storage battery. All four wheels steer; and, in consequence, the truck can be used on congested floors. The wheel and motor bearings are ball or roller type. The capacity is 3,000 to 5,000 lbs.

As shown in the accompanying photograph, the truck is designed with a fork on the front, which may be shoved under the load to be carried and then raised vertically along the two uprights. When the load is raised to a sufficient height, the uprights are tipped backward at an angle of 40 deg. in order to hold the load securely while the truck is in motion. The truck can be used for stacking purposes. When the truck is driven on an elevator without load, the fork may be folded back on the truck so as to considerably decrease the overall length.

The vertical and rocking motion of the forks is obtained by means of a double drum electric hoist. The upper drum rocks the frame, while the lower one elevates the load. The upper drum cable pulls the vertical uprights toward the operator against the action of a pair of heavy springs. These springs with cable form a cushioned rest for the load; and, when the cable is fully paid out, the uprights pitch forward slightly, which in turn throws the tips of the fork downward for insertion beneath the load.



Elwell-Parker Type ER Tructor

SAN ANTONIO, TEX. More than 200 manufacturers will be represented with exhibits at the Texas Industrial Exposition in Dallas, Oct. 10-25, the textile industry to be well represented, according to G. M. Knebel of the Texas State Manufacturers' Association, who says at least 1,000,000 visitors are expected.

RECENT TEXTILE PATENTS

COTTON chopper. 1,551,398. J. A. Johnson, Shreveport, La.

DYEING sulphur colors on silk. 1,551,330. F. L. Remlein, Penns Grove, N. J.

DYESTUFF intermediate, Producing a. 1,550,749. L. M. Shafer, Irvington, N. J.

DYESTUFFS containing chromium, Production of. 1,551,073. F. Straub, Basel, Switzerland.

FABRICS, Apparatus for uniting knit. 1,551,188. J. Buckreus, Hartford, Wis.

GILL box and drawing frames, Stop motion for. 1,551,118. E. Platiau, Woonsocket, R. I.

LOOMS, Bobbin support for. 1,550,922. W. J. H. Murray, Glendale, S. C.

LOOMS, Feeler mechanism for. 1,551,191. E. A. Cuniff, Waltham, Mass.

LOOMS, Warp stop motion for. 1,551,208. J. Northrop, Hopedale, Mass.

SHUTTLE. 1,550,709. C. Schaum, Philadelphia, Pa.

SHUTTLE feeler thread parter. 1,550,811. R. Jamieson, Utica, N. Y.

SHUTTLE withdrawing device. 1,551,246. P. D. Doherty, Worcester, Mass.

SILK, Manufacture of cellulose acetate artificial. 1,551,112. H. S. Mork, Brookline, and C. F. Coffin, Jr., Watertown, Mass.

SPINNING frames, Holddown device for. 1,550,654. E. R. Alderman, Holyoke, Mass.

SPOOL, Textile. 1,551,247. W. A. Fassnacht, Philadelphia, Pa.

SWEATER. 1,551,059. M. Schnellbacher, Brooklyn, N. Y.

TENSION equalizer. 1,550,881. H. D. Colman, Rockford, Ill.

WEFT detecting mechanism. 1,551,219. E. H. Rayon, Pasadena, Cal.

YARN, Machine for determining uniformity of. 1,548,918. E. D. Walen, Watertown, and A. H. Parsons, Gloucester, Mass.

YARN spool. 1,549,000. E. F. Hathaway, Wellesley, Mass.

Business Literature

CATALOG OF INDUSTRIAL AND TEXTILE APPLICATION; The Fafnir Bearing Co., New Britain, Conn.

This catalog, which supersedes an older one, deals with the application of Fafnir ball bearings units to shafting and textile machinery. A full account of advantages to be derived from the use of ball bearings is given. The book being illustrated with photographs of actual installations in mills and containing complete and up-to-date data on the principles of ball bearing tranmission and textile applications, forms a handbook that makes it more than a catalog and of value to all who are using or considering the use of ball bearings in their machines or plants.

The catalog is divided into two sections, the first dealing with transmission equipment, such as hanger boxes, pillow blocks, fan boxes and loose pulleys and the construction of the Fafnir Line, which embodies exclusively the long inner ring and self-locking collar; latest dimensions, prices and construction of Fafnir Line, in which radical changes have been made since the catalog was issued, are given. The second section deals with textile applications proper, such as picker beater and fan shafts, cards, slashers, spinning frames, etc., together with the advantage of ball bearings on each one. Individual Fafnir applications for various makes of machines are shown, with mounting dimensions and construction details.

THE PLAN BOOK OF THE INDUSTRIAL LIGHTING ACTIVITY; Industrial Lighting Committee, National Electric Light Association, New York.

Described as "a complete plan of organization of local communities for the operation of a nation-wide campaign to increase sales and profits on industrial lighting installations," this interesting piece of literature is an excellent example of the cooperative promotion work that may be done by an industry for itself. Complete details of procedure for local electric light units in a campaign to better industrial lighting conditions throughout the country are outlined. Concrete help is offered to the local units in interesting industrial executives in the better lighting of their plants.

Draper Outing Successful

The office force of the Draper Corporation, Hopedale, Mass., held its seventh annual outing on Sept. 12, the destination, as usual, being a secret until it was reached. The gathering left the office at 1:15 p. m. in automobiles and went to the West Medway (Mass.) Recreation Association's field where the sports took place. Later the party motored to Holliston, Mass., where a turkey dinner was served in Odd Fellows' hall, followed by an entertainment. S. Walter Batty was chairman of the general committee of arrangements.

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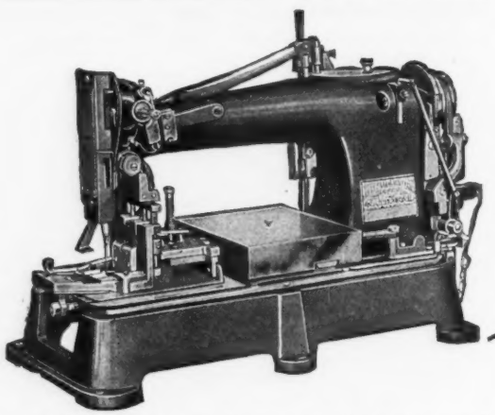

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Chats with the Textile Chemist

The Physiologist Studies the Silk Fibre, So Why Not the Textile Chemist—The Silkworm a Chemical Laboratory—Some Views on the Extension of Cotton Growing—The Dream of Ramie a Ghost That Prowls Ever and Anon

By J. Merritt Matthews

THE silk fibre has long been an interesting object of examination for the physiological chemist, and most of our information concerning the properties and composition, as well as the intimate structure of this fibre, has been contributed from the physiological field of chemistry rather than from the textile field. The well-known physiological chemist Abderhalden, and his co-workers, have given us much insight into the composition of this fibre from a chemical point of view. But most of this information has been rather of an academic character, and has really been of little value to the manufacturer or user of silk materials.

What Silk Really Is

The dyer and the textile processor perhaps know little and care less for the rather abstruse researches of Abderhalden and the fact that the true silk fibre stripped of the silk-glue consists of a long list of strangely sounding substances—such as glycine, dextro-alanine, laevo-tyrosine, and the like. All this does not hitch up at all with their idea of silk as a commodity. Even the textile chemist in the silk mill, who is supposed to know all these things and to be able to make use of them in the handling and processing of silk, is somewhat nonplussed when it is reported to him that our friend Abderhalden in a recent research on silk, published in the *Zeitschrift fuer Physiologische Chemie,* stated that the proper hydrolysis of the decomposition products of silk may indicate the presence of diketopiperazine. Thank goodness we still remember enough of our organic chemistry to recognize that this has something to do with pepper.

Crystalline Structure

It is interesting to find, however, that silk is now being taken up as a serious study by other than physiological chemists. We are beginning to find names that we recognize as textile chemists in the literature, and this is an encouraging sign. Herzog and Jencke, for example, have recently made a study of the substance of the silk fibre under the X-rays. Their examination seems to indicate that this material possesses a crystalline structure. This is somewhat of a variant from the older ideas on this matter, which all considered silk to be of a glue-like nature, homogeneous and without internal structure. A little different angle, however, is furnished by another chemist by the name of Brill, who states that his researches lead him to the conclusion that the silk fibre is a mixture of at least two substances, only one of which is crystalline in structure.

Field for Textile Chemist

It is evident that there is a fertile field for chemical investigation in the matter of the silk fibre. And by the silk fibre we mean the degummed silk, the real silk fibre as the user knows it, not the raw silk of commerce which is complicated by the presence of a lot of gum or glue. It is a field, however, which the textile chemist rather than the physiological chemist should tackle. The latter is more given to the altruistic researches of pure chemistry, and has delved into the silk matter because he was interested in the products of the living organism and wants to study them in the most intimate manner.

When the textile chemist gets the same flair for his work, he too will no doubt get busy on these matters. But he will have to bring to it the same intense scientific enthusiasm that is evidenced in other fields of research. A knowledge of the intimate composition and structure of the silk fibre is of the utmost importance to those who handle and treat this material, and no addiiton to our data in this line would be unavailing, if properly linked up to the main idea in view, the most efficient utilization of the silk fibre to the needs of man.

Silkworm a Factory

While on this subject of silk, it is brought to our consideration that the silkworm is really a chemical factory converting mulberry leaves into the fine and delicate substance known to us as the silk fibre. There is evidently a considerable transformation of materials, both in a chemical and physical sense, if we consider the wide disparagement between the mulberry leaf and the silk fibre. However, there is some method of linking the two up as ends of a continuous chain of events, and the silkworm knows how to do it. At least he is the unconscious agent in the bringing about the various chemical reactions that result in the conversion of the substance of the leaf into the substance of the fibre, as well as the changes in the physical characteristics of these substances that lead to the production of a continuous filament of great strength and wonderful properties.

All these changes and conversions of one thing into another are proper subjects for the investigation of the chemist and the physicist, and while it all may seem rather far removed from the field of our human endeavor as far as the production and utilization of silk materials is concerned, nevertheless it all has an important and far-reaching influence on this very thing. To watch the silkworm manufacture silk is an interesting and edifying avocation, but it does not help matters much. To try to understand how the silkworm manufactures silk is something far different, and is in every way worthy of every effort and encouragement.

Understanding will lead to the utilization of knowledge; and, if we could get to be a sufficiently intimate friend of the silkworm to be aware of his mental and physiological processes, we could no doubt help him a lot in improving both the quality and quantity of his life's work. Or we might even go him one better and show him how to make silk better and cheaper than he can make it himself, and that would really be worthwhile. But we are afraid we are dreaming of greater things than either the physiological or the textile chemist is willing to admit as possible. We are perhaps of that intellectual ilk that dream great things but leave to others the problem of carrying them out.

* * *

South's Cotton Supremacy

Cotton growing is a subject of perennial discussion, not only by the fibre expert but also by the economist and the politician. If all the lands that are claimed to be just the ideal ones for the production of high grade cotton were cultivated, we would all be suffocated in an overwhelming sea of this soft and fluffy fibre. Here in the United States we are continually being threatened with the loss of the cotton industry on account of our hardness of heart and speculative tendencies, which in time will surely drive all foreigners to the growing of their own cotton. But the supremacy of the southern states in the production of cotton still seems to be maintained without much loss of either prestige or volume of business.

The textile literature is full of reports of all sorts of attempts in various parts of the world at the growing of cotton. We read of cotton cultivation in Turkey and Asia Minor, in Brazil and Columbia, and other South American countries, in Africa and Madagascar, in Russia, in the West Indies, and indeed wherever sun and rain and soil and climate at all approximate those conditions that are supposed to be beneficial for the development and growth of this fibre. India, China and Egypt are shown to be potentially enormous producers of cotton. In fact, any one of these countries, if things were gone about in a right and proper manner could produce all the cotton needed by the world.

New Fields Unnecessary

Nevertheless, most years seem to show an overproduction of cotton, rather than a lack of supply. The cotton industry of the world, even seven years after the close of the great war, still seems to be rather down in the dumps. There seems to be more capacity of production of cotton and its manufactured products than the world under the present conditions can take care of. So we marvel somewhat at all this furor over the development of new fields for the growth of cotton. It would seem to be far better to expend this energy and thought to straightening out in some sensible manner the problems of the present production of cotton, rather than creating new problems entailed by extending the growing of the fibre. What we are going to do with it after we grow it is perhaps more to the point than increasing the production of cotton in India to many times its present output.

The British cotton people seem to be especially excited about this matter of growing cotton; but how it is going to help the great unemployment at present so noticeable in the Manchester cotton mills is somewhat difficult to see. If it were a matter of price, and it were possible to so extend the growing of cotton to places where good quality cotton could be produced at a much lower cost than it is now produced in our own southern states, there would be some reason in this thing. But it is doubtful if this is possible; and, even if it were possible, it is further doubtful if such a lowering in the price of raw cotton as could be reasonably expected for an equivalent grade would bring about the conditions desired; that is to say, a sufficiently increased market for manufactured cotton goods.

It is true the South grows cotton in rather a haphazard and uneconomical manner, and without special reference to the conditions of the Manchester cotton industry; but, even at this, it is continually on the verge of growing too much and thus demoralizing the cotton market by a sudden slump in prices. This would seem to indicate that, if the problem were really handled in the right way, the South could actually produce more cotton than the world can take care of, taking into consideration the particular staple and quality in question. What, then, will we gain by opening up new fields of cotton production, of an uncertain quality and staple and of an unknown factor as to the character of goods it is capable of going into? For purposes of academic dis-

Spun Silk is real silk, made from the cocoon of the silkworm.

A Winning Combination

COTTON and Spun Silk combine with great success. Spun Silk yarn can be used for either warp or filler.

In such fabrics as fancy mixtures many interesting heather effects can be gained. Color, wearing qualities and silky texture make a combination that offers great possibilities.

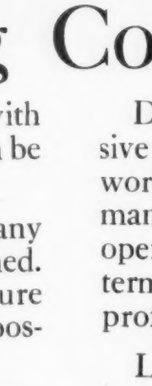
Spun Silk is also meeting with success when used for both warp and filler in pongees produced on cotton looms.

The cost of Spun Silk is much less than that of raw silk; yet Spun Silk is genuine cocoon silk. Spun Silk can be dyed all colors that raw silk will take.

The special characteristics of Spun Silk make this yarn worthy of study by cotton manufacturers. It is most adaptable and has proved its ability to increase production in goods that find a ready market.

During thirty-four years in the exclusive production of Spun Silk yarns we have worked out many problems with many manufacturers. We would be glad to cooperate with you if you would like to determine whether Spun Silk can be used profitably in your mill.

Let us send you our table of sizes showing the corresponding sizes of spun silk, cotton, raw silk and other fibres.



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Champlain Singles

For years we have given special attention to developing Spun Silk Singles. We make the following three qualities of Singles, each of which can be had in any size desired:

Seneca: An extra long staple yarn, notable for its white color, exceptional cleanliness, lustre and filling qualities.

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Placid: A new short staple Single, white, clean, lustrous and of excellent filling qualities—a yarn absolutely unequalled at the price.

All of the above Singles can be produced with a warp twist.

CHAMPLAIN

SPUN SILK

cussion, it is easy enough to grant that India or China or Madagascar could potentially grow all the cotton the world needs, and in the same way we could probably obtain our entire supply of ice from the Polar regions, but we would not recommend our ice plants going out of business on that basis, or even getting excited over the prospect of Arctic competition.

* * *

Enthusiasm for Ramie

The subject of new fields of development for cotton growing and the criticisms we have made in regard to it brings to mind the matter of ramie and the continual eruptions that take place concerning its growth and methods for preparing the fibre from the plant. Much has been written in praise of the ramie fibre, and there has doubtlessly been some exaggeration inspired by the over-enthusiasm for something new; but it has been extolled to the skies for its strength and durability and heralded as the long-sought Golden Fleece of the textile industry. Primarily, it is to replace linen; but there are even those who are enthusiastic enough to predict that it will put cotton out of business. It is claimed to grow like a weed, give large yields per acre, and to be adaptable for cultivation in many parts of the United States where cotton could not be profitably grown.

That the ramie fibre has excellent qualities there can be no denying. We have seen enough of it and its manufactured products to be well aware of this. That ramie can be grown in this country and furnish excellent fibre has also been demonstrated experimentally. But, growing this plant experimentally under favored conditions of cultivation is one thing, and growing it commercially on a large scale of operation is quite another thing. There are factors that come into play that the experimentalist never thinks of, or at least never comes in contact with during the short period he has the cultivation of this plant under observation. The diseases to which the plant may become subject, the changes which it may undergo during prolonged cultivation, its effect upon the soil, and many other things that gradually develop, although it may often require years to do so, will frequently militate in the long run against the permanent cultivation of a new plant species.

Fibre Separation Difficult

But what sticks mostly in the way of progress for the ramie business is the difficulty of obtaining the fibre from the plant after it has been satisfactorily cultivated. The fibre is so imbedded in the stalk of the plant and cemented down by a hard and persistent gum or mucilage that the pure fibre is about as hard to separate as the fibre in a piece of wood. By hand stripping and processing with chemicals, such as boiling with solutions of caustic soda, it is possible to get out a nice clean, long, white and silky fibre, and forsooth with an excellent yield—in the laboratory.

Those who have taken a ramie stalk and separated the fibre in this way by hand methods are so impressed with the marvellous fibre they have prepared that they are simply carried away with enthusiasm for this textile product. If they are of an imaginative turn of mind, and most of these experimenters are, they rush out and proclaim the coming of the millennium and the doom of linen and cotton. Of course, the first thing is to get hold of somebody who can be induced to back the prospect financially, for suitable machines have to be made to get the fibre out on a large scale, and experiments have to be made in carding and combing and spinning and weaving, and the discoverer is usually hard up for money himself and needs a little capital to carry on with regard to his own personal expenses.

Many Attempts

These schemes have usually been good business for the textile chemist and the fibre expert, for usually these professional men are called in at some stage or other to investigate the claims of the inventor and make experiments and calculations and formulate a report on the entire matter. We have been regaled with many of these ramie dreams; in fact, in some good years as many as three of these propositions have come to our attention.

They are practically all of the same category, and not one of the enthusiasts is ever aware that anybody else has ever done practically the same thing before. They always think they have discovered something entirely new, and no amount of persuasion can convince them to the contrary. These people all seem to think that the getting out of the fibre from the stalk can be easily accomplished by their mysterious chemical process, which usually narrows down to a treatment with boiling alkali and soluble oil and sometimes with a bleaching process with hypochlorites thrown in. The fibre they produce is beautiful, there is no doubt about it; and if they could sit down and spend the rest of their lives at it they could no doubt produce a couple of tons of fine ramie fibre.

But the "nigger in the woodpile" in all these things is the commercial production of the fibre on a scale and in a quality suitable to the requirements of the textile industry. This is where these ramie dreams blow up. The inventor seems to think it an easy matter to perfect a suitable machine for taking out the fibre—decorticating it, as the fibre man calls it. But so far the world is still waiting for such a machine. We understand that in India there is a large prize offered for the production of a machine capable of doing this very thing, but this offer has stood for many years and no one has as yet been able to collect on it.

Present Supply

With this in mind, the inquiry naturally arises as to how the ramie is obtained that is now used for its manufacture on a limited scale. There is a certain amount of ramie yarn spun in this country and manufactured mostly into mantles for incandescent gas lamps. And there is also quite a sizable ramie manufacturing industry in Germany, though it never seems to grow very large, but seems to stay about the same as it was before the war.

The answer to this conundrum is that the ramie fibre is obtained from China, where it is produced from the plant by hand stripping and preparation. A man working all day can produce but a very little amount of fibre, but a few cents a day is all he expects, and he is willing to work for such a wage. Even at this, it makes the ramie so produced a fairly costly textile fibre, and there does not seem to be sufficient demand for it under these conditions to give any enormous number of Chinamen occupation in taking out the fibre by hand. If there were, there would be no reason for unemployment in China, if they were willing to work for such a meagre wage.

Dyeing Rayon in Hosiery

(*Continued from page* 51)

to some extent, tying up. When making additions of soaps or soluble oils to the dyebath, the quality of the water must be considered, as hard waters are quite unsuitable for such additions. For medium and dark shades, glauber's salt is added, from 10% to 25% on the weight of goods. One hour's dyeing at the boil should give a good result, providing that a reasonably accurate stuffing was originally given.

In selecting colors to be used for the dyeing of artificial silk and cotton hose, it is important that dyes be chosen which give approximately the same shade on the artificial silk as on cotton, and at the same time good levelling colors are desirable, particularly for shading purposes.

The direct blues are the weakest in this direction as, speaking generally, they are the worst for level dyeing and also dye the artificial silk more than cotton. Most hosiery shades, however, can be obtained quite readily without having to use blues. The dyeing of a navy blue illustrates this point, as it is quite impossible to obtain anything like so heavy a shade of navy on the cotton as on the silk. Nigger brown is another shade which has given trouble, inasmuch as the cotton tops in hose are liable to show on the yellow side.

Rayon and Cotton

The dyeing of artificial silk has, speaking generally, been considered to be practically identical with the dyeing of cotton. It has hitherto been assumed that all direct cotton colors are as suitable for use with artificial silk and cotton mixtures as for cotton alone. This is clearly not the case if the best results are to be obtained. Only a limited number can be considered eminently suitable from the point of view of yielding the same tone of shade on the cotton as on the artificial silk. It is therefore of importance that colors be used so that the final dyed result is pleasing to the eye—that as near a match between the artificial silk and the cotton is obtained as possible.

The dyed black is sometimes aftertreated with formaldehyde, which both improves the shade and also the fastness to washing. Sulphur blacks have been used, and while this gives a superior shade, there are other disadvantages, inasmuch as viscose is adversely affected by hot alkaline liquors, and when in this condition is easily damaged. In this respect nitro-cellulose silks are even worse.

Rayon and Wool

The dyeing of artificial silk hose with wool admixture presents a more difficult problem for the dyer. There does not appear to be any short-cut method to success by using union colors and expecting perfect results, as so much depends on the proportion of wool to vegetable fibre, which may vary from, say, 50/50 to 95/5, and upon the length of time required to obtain a perfect match and perfect levelling. The longer the time in the dyebath, the more the wool takes up the cotton colors when at the boil. The careful way is probably the safest—dyeing the cotton to pattern and finally shading the wool with neutral dyeing acid colors.

Here, again, a careful selection of colors is very important. Direct colors should be used which dye the wool the same tone as the cotton and artificial silk, but which dye lighter on the wool than on the cotton, and avoiding direct colors which dye the wool deeper than the cotton and those which dye a different shade on the wool. For example, most direct browns when dyed on wool and artificial silk and cotton will be found to dye the wool much yellower than the vegetable fibres. It is advisable to keep the wool portions of the hose on the light side, as the finished hose looks better so, and also when the wool is on the heavy side it is an extremely difficult matter to rectify the defect. This class of hose is best tacked in singles, toe to welt, using a short loop only and using a loose twisted tacking cotton in order to avoid pulling the cashmere feet into holes.

Perhaps it is more important to emphasize the colors to avoid rather than make recommendations of which dyestuffs to use. For example, as before mentioned, most direct browns, when dyed on cotton and wool at the boil, will dye the wool very much yellower than the cotton, and this is exactly what must be avoided, as otherwise, by the time the yellow on the wool is neutralized by means of neutral acid colors, the shade on the wool will be too heavy. Hence, avoid all direct browns unless known to dye cotton very much heavier than the wool at the boil. The position might be summed up by saying that

Adjectives!

HENEY QUALITY is so well known that adjectives are unnecessary. It is enough to say that we are constantly studying the needs of silk, cotton and woolen weavers that Cheney Yarns may even more closely fit those needs.

Cheney Brothers are a permanent factor in the silk yarn market and are maintaining a constant production of standard and special yarns for every purpose.

The Yarn Department now stands ready to fill your immediate needs and welcomes the opportunity to assist in planning for your future requirements.

CHENEY BROTHERS

215 Fourth Avenue at 18th Street, New York City

Mills: South Manchester, Conn.

CHENEY SILK YARNS

the union colors, as a class, are best left alone unless for some particular shade, where experience has shown their value.

Silk and Rayon

Another development in the hosiery trade is the introduction of real silk in combination with viscose and cotton, this being an attempt to produce a stocking with a real silk handle at a cheaper price than all-silk hose. The American hosiery manufacturers appear to have developed this idea very successfully, and there has been a large number of such hose sold in this country. In the dyeing of this class of material, the selection of dyestuffs is the chief factor towards success, as many of the cotton colors have not much affinity for real silk. Dyeing is best done just below the boil with glauber's salt, with or without soap.

The direct blues present the most difficulty, but this can quite easily be overcome by using neutral dyeing acid colors. Other problems for the dyer when mixed fibres are present are immediately obvious, such as either leaving one fibre undyed or giving a two-color effect. The commonest of this type is the wool and artificial silk, which is the same problem as wool and cotton from the dyer's point of view.

In dyeing wool only, the heavy shades, such as blacks, navys, and nigger browns, are best dyed with chrome colors, as when dyed with acid colors the ordinary household wash is sufficient to cause the color to run badly, leading to complaints, whereas properly dyed the chrome way is entirely satisfactory.

For the lighter shades the acid colors are quite suitable, and with very few exceptions leave the cotton and viscose perfectly white. Another method for blacks is to use a hematine black on chrome mordant and clear the white afterwards with a slight chlorine bath.

Knitting Seamless Hose

(*Continued from Page* 51)

winding artificial silk and two methods are widely used. One is to wind the yarn from hand to a double-ended flanged bobbin which is frictionally driven. The bobbin is drawn to a standstill immediately a twisted hank occurs, and the hank can be straightened out. The yarn is wound from the double-ended bobbin on to a bottle bobbin on a machine driven at three times the speed of the first machine.

Several winding machines with very ingenious stop motions may now be obtained and the winding of silk from hank to bottle bobbin in one process is considered safe.

The Measurer

If measurement is left to the operator the results are usually far from satisfactory. A method found very efficient is to pass all the hose to a measurer, a girl specially trained to measure the hose. The operatives tie the hose in bundles of 24, each lot having a ticket showing:—

1. Operative's name.
2. Order number (copied from working order).
3. Number of dozens.
4. Yarn.
5. Size.
6. Gauge of machine.

The measurer then cuts and measures each hose, those that are too long may do for a larger size, and those too short for a smaller size. Where the length is only half an inch or so out, those too short may be marked to be boarded to correct length, and those too long are cut down. By this method of measuring, the goods are more uniform in length and save considerable time in pairing when finished. When a change of yarn or size of hose is made on a set of machines, the operative should send a hose from each machine to the measurer. Each hose should be marked to show the machine on which it was made. The measurer would say if any adjustment was necessary on any machine to obtain uniform lengths, thus saving waste in cutting down.

A point which should receive attention is the effect of lather on the length of hose. Several tests have been made by the writer and the following behavior was noticed. The tests were made without any alteration to the machine, medium quality worsted yarn being used.

A hose was made with yarn wound dry, no lubricant being used on the winding machine and the length of the leg was found to be 28 in. Freshly wound lubricated yarn was next put on the machine and the hose was made 30½ in. in the leg. Hose were made with the same bobbin of yarn after four and after eight hours and the lengths were 29½ in. and 28½ in. respectively. The four hose were measured the next day and were found to be all 28 in. in length. This indicates that the yarn assumes its normal size as the moisture evaporates and suggests that more investigation in this line should be made.

Hose made with damped yarn should be made longer than required when finished, or they will be too short when they return to normal condition.

Weight Per Dozen

Hose and half-hose are usually dealt with by the weight per dozen pairs. When lengths have been adjusted on the machines, a dozen pairs should be sent to the finishing room, lengths checked again, toes closed, welts turned and the goods weighed.

If the goods are not the weight required for the order to which they are being made, alterations may be conducted before a lot of hose have been made. A 166-needle 3½ in. diameter machine working 21s worsted will give a garment at about 1 lb. 15 oz. or 2 lbs. per dozen pairs of ladies' hose. 22s worsted could be worked on the same machine to give a lighter article, or 20s worsted to give a heavier line. To obtain a much wider range of weights, it would be necessary to have machines of other gauges.

A lot of trouble is caused by trying to obtain a wide range of weights from machines of one gauge. Orders are sometimes given to machine foremen to produce an article at a certain weight when he has not the machines of the required gauge. Sometimes a coarse yarn is put on to a machine to try and get the weight, and, the gauge of the machine being too fine, a large percentage of waste results. The machine needles and sinkers are bearing an extra strain and are more liable to break. The resultant fabric will have a full appearance owing to the yarn being crowded into the space between needles and sinkers. The garment will lose in elasticity, which property is essential, especially in the top of the leg.

Whittall Sends Demonstration Loom on Two-Year Trip

A demonstration car of the M. J. Whittall Associates, Worcester, Mass., outfitted at a cost of $35,000, left that city on Sept. 4 on a two years' trip which will cover about 7,000 miles and visit 25 States, as far South as Texas and West as far as Nebraska. The car in reality is a specially constructed automobile bus and in place of the seats for passengers the space is devoted to carrying a home-made true Jacquard rug loom.

This loom was built at the Whittall plant by the veteran weavers, Henry and Joseph Coley, who will accompany it on the long trip. The first stop will be in Harrisburg, Penn., where the loom will be demonstrated making rugs in one of the large department stores for two weeks. The program calls for a two weeks' demonstration in each of the large cities to be visited. Its workings will be explained by the Coley brothers to all visitors to the stores. Wilfred A. Midgley, a loomfixer at the Whittall plant, will accompany the loom on the trip, while the chauffeur of the car will be Paul C. Faneuf.

The M. J. Whittall Associates have given demonstrations of their looms in actual operation in various cities of the country for years, but this is the first time a loom has been taken on an automobile tour. The car is properly advertised for the occasion and this will add to call attention to a famous Worcester product. The car is so constructed that the loom can be taken out entire through a rear door of the car and set up without any difficulty.

The car was given a sendoff before leaving Worcester by Mayor M. J. O'Hara and members of the Rotary Club, the latter being invited to inspect it by their fellow rotarian, Matthew P. Whittall, president and treasurer of the M. J. Whittall Associates. It is believed the Whittall associates are the first among the textile interests in the country to start such a novel advertising campaign.

Evening Silk Courses

Broad Silk Analysis Classes Reopen at the New York School

The New York Evening Textile School conducted under the auspices of the Board of Education announces the reopening of its free evening classes on silk construction and analysis on September 21. This course will be given by Joseph S. Kaskel a graduate of the Koniglichen Hohere Webeschule at Krefeld, Germany.

The same course will be given on Monday and Wednesday evenings as on Tuesday and Thursday evenings from seven to nine. It will cover the basic weave constructions and their derivatives; the methods of designing and plotting on textile design paper; reed and harness drafting and the making of chain card designs. The identification and the recognition of all classes of silk and silk-mixed fabrics will be explained. The technical equipment and the textile machinery of the Textile High School will be utilized to demonstrate the throwing, winding, warping and weaving of silk.

Actual samples of fabrics secured in the open market will be analyzed by each student under the supervision of the teacher. In the field of calculation pupils will be taught how to figure quantities of textile yarns for given yardages and the estimation of the various labor and overhead charges which enter into the manufacture of broad silk fabrics.

The course is intended for men and women in the wholesale field as well as for those in the mill who desire a more intimate knowledge of the silk business. No special educational qualifications are required as the work will begin in an elementary manner and gradually progress to the more intricate points. As these classes under Mr. Kaskel's direction have in the past years exceeded the quarters allotted to them causing the rejection of many students, it is urged that those desiring to take the course register promptly as the number that can be accommodated is limited.

Prospective students and those interested may register or obtain further information at the Textile High School, 124 West 30 Street, Manhattan, any school evening from seven to nine on and after Sept. 14.

Build Special Cars for Raw Silk Transportation

MONTREAL, QUE., CANADA.—The National Steel Car Co. of Hamilton, Ont., has been awarded an order from the Canadian Pacific Railway for the construction of special cars for the transportation of silk. The new cars are unusual in construction, being specially designed to meet the requirements of the silk industry just as refrigerating or cattle cars are made to fill the demand of those services. The cars will be 45 feet long and approximately the same width as baggage cars.

Universal Wound Filling Will Keep That Waste Pile Down

WEAVE room yarn waste is pretty expensive and is an important factor in cloth making costs.

Using filling yarn prepared for weaving by Universal Winding will reduce waste where it is most costly and deliver to your looms, long run bobbins of inspected perfected yarn.

You will gain better quality cloth and a saving of doffing time by the use of this important development.

Keep in mind that the cost of preparation is offset by the total saving. Let us submit the proof of these statements to you at your earliest convenience.

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QUESTIONS AND ANSWERS

CORRESPONDENCE WITH READERS

Under this head, we undertake to answer, free of charge, to the best of our ability questions pertaining to textile matters received from any regular subscriber to TEXTILE WORLD. Inquiries should give the fullest information and data possible. In the case of damage to material, a sample should be sent. In this way answers can be given which will be of immediate technical value to the correspondent and to others in the same line. Inquiries pertaining to textile processes, machinery improvements, methods of management, the markets, etc., are especially invited as well as any legitimate discussion on the views expressed. All inquiries must be accompanied by the name of the person inquiring, not for publication, but as an evidence of good faith. The identity of those seeking information on technical subjects will not be disclosed.

If the question is not of general interest to textile readers and involves expensive investigation, a charge covering the cost may be made, of which the inquirer will be advised before any expense is incurred.

Letters expressing opinions or voicing criticism will be signed by the correspondent's name unless the letter itself contains a request that the name be withheld.—EDITOR.

"Shiners" in Rayon Filled Cloth

Technical Editor:

We are using considerable rayon in 150 denier. While rayon is not a new thing for us to use in fancy styles, on dobby weaves we have no trouble owing to the fact that the pattern usually breaks up any defects that there may be, but when we weave a plain cloth such as 64/60, or twills, we have trouble with "shiners." I am enclosing you a swatch which is ticketed, construction 38 in. 72/72, and in this particular piece of cloth the "shiners" are exaggerated. These were made intentionally in most cases. The other swatch, which we have had dyed here at the mill, shows the "shiners" after finishing, same as in the gray.

We have been experimenting with this, and have tried various methods. We have oiled our silk, which appears to help to some degree, and we have also sized our filling, but it appears, so far as we have gone, that whatever precaution we may take, we still have some of these defects. We are still working on this and trying various methods to overcome the same, such as using care in the weaving and winding processes, but as yet it seems to be almost impossible for us to weave one cut of cloth without several of these defects, which in some cases are quite pronounced. Any assistance that you could give us in this matter will surely be appreciated. (5534)

Taking up the gray plain woven sample, the picks that are shiners on this sample have not been woven tight. They have been pulled tight by human agency in order to try and pass the buck to the weaver. It is not the shuttle that has pulled them tight because in most every case, the filling is broken at the selvage and you will note a double pick on the selvage side of the cloth, showing that the pick is broken for one-quarter inch from the body of the cloth. There is only one thing, other than human agency, that could bring about this condition and it is as follows: If the cams are set to close very early, and a knot is holding the filling back, the shed would close on the filling before the shuttle reached the end of the opposite box. But it is really out of reason to say that the filling would break at this exact spot every time that the filling was held back by a knot on the tube. A large knot is about the only thing that could cause the filling to hold back, considering that the rest of the cloth is woven without shiners.

Take the gray woven sateen sample as another example. You will note that where the uneven shaded filling is woven in the cloth there is no such condition on the selvage side of the cloth. The picks that are uneven shaded are woven in very loosely and the selvage, where the uneven shading is the worst, is very straight, showing that the picks are woven in loosely and the picks show in the cloth as woven loose. I have pulled a few picks tight to show the difference between a real tight pick and an uneven shaded pick.

The yellow sample is a glaring example of uneven shaded filling. You will note that the uneven shaded places appear in streaks which do not extend across the cloth. Is it not reasonable to expect a pick that is weaving tight to show a tight place from selvage to selvage? The selvages on the yellow sample are very light and a filling of the size of 150 denier, and pulling tight from a shuttle, would certainly pull very hard on light selvage. These selvages show that no pull has been imposed on them; they are splendidly woven and are very even and straight.

The condition of the selvages on the yellow sample show that very little friction has been used in the shuttle that wove this cloth, and the manner in which the streaks appear in the cloth prove that the fault lies with the filling.

As a further test to practical weavers I would advise the following as a setting of the loom to disprove the idea of too much friction in the shuttle. The setting I am about to advise is not practical for weaves where the sley or pick is heavy but all practical weavers will see what the writer is trying to prove.

Set the cams or dobby crank for a very late closing of the sheds. This means that the shuttle will reach the end of the opposite shuttle box before the shed closes on the pick of filling. During the passage of the shuttle across the loom, the filling has been unwinding very rapidly. When the shuttle reaches the end of the shuttle box, on the opposite side from which it started, it will rebound slightly. Most all shuttles do this, and this rebound will let the filling lie loose in the still open shed. In this manner the shed will close on a loose pick of filling. This setting will be rather hard on the selvages and if the pick and sley are medium heavy the cloth is liable to bump back some, because the sheds will commence to open and draw the fell of the cloth towards the reed, and as this is the time that the reed is approaching the fell of the cloth at its greatest speed, it is much like a collision between two objects that are moving towards each other.

The writer would advise mills to try this as a remedy. When cams or dobby are set to open the sheds early, this opening movement is completed before the reed reaches the fell of the cloth, and the moving reed strikes the fell of the cloth when the fell of the cloth is stationary and there is no bumping back of the cloth.

Dyeing Velvet

Technical Editor:

Yours to hand of Aug. 17, with particulars of the sample of velvet. What we really require is the process used in dyeing and finishing this material and also the kind of machinery used. This material is in the gray unfinished, and will be required in all colors and properly finished, and as this is the first transaction with this class of goods we are anxious to get all the information possible. (5536)

The goods should be run in the open width through a gas singer, as this type of machine is more adaptable for such a fabric having an uneven surface. Any sparks remaining are extinguished during a quick rinse. From the singer the goods are run in rope form through an ordinary washer, at which time any water-soluble impurities are removed. If light or bright shades are desired, the goods should be given a thorough bleaching.

The bleaching process may be made as elaborate as desired, depending upon the kind of material to be bleached, but consists principally of running the goods through a cold 1 to 2 deg. Tw. bleaching solution (chloride of lime or liquid chlorine are both extensively used today), and then allowing them to remain exposed to the air for one to two hours. A hasty wash removes any excess bleaching solution, and then a sour in a 2 to 3 deg. Tw. sulphuric acid (oil of vitriol) solution; a passage through squeeze rolls; and another through washing brings the goods ready for the dyehouse.

The method of obtaining a satisfactory shade of black has been given in the Sept. 5 issue of TEXTILE WORLD. Probably the class of dyes most used to obtain a range of shades (other than red) on such material are the sulphur colors. These dyes when applied properly produce shades of good fastness to washing and light, but of a more sombre cast. Jig dyeing machines are used largely for sulphur dyeing, and consist of two fixed rollers which are driven by gears located above a 35 to 45 gal. vat, and several smaller guide rolls submerged in the vat. Sulphur colors are dissolved in an equal weight of sodium sulphide conc., and when in complete solution are added in portions, together with the soda ash (2 to 3 lbs. per 100 lbs. of goods), and common salt (30 to 40 lbs. per 100 lbs. of goods) to the dye vat. Eight to 12% of dye is required for blacks, and anywhere from 4 to 8% for other shades. The temperature of the vat is raised to a light boil and the goods, following the leader, are run through the liquor from one roll to the other. More of the dye solution is added and the goods run in the opposite direction. After all the dye and assistants have been added, the movement is continued until the desired shade is obtained.

After dyeing, a thorough rinse in warm water is given to remove any excess dyestuff or sulphide present in the fabric, and then a cold rinse. If a standing bath is used, the first rinse water may be returned to the dye vat, or used for dissolving an addition of dye. In such cases, the specific gravity of the dye liquor should be kept at 6 to 10 deg. Tw., depending upon the depth of shade. Sulphur colors seldom exhaust completely, so that a standing bath is very practical for dark shades.

After hydro-extracting, particularly for blacks, the goods are sometimes run for 20 to 30 minutes in a fresh bath, containing 1 to 3% bichromate of soda, and 2 to 3% acetic acid, at a temperature of 140 to 160 deg. F. This treatment tends to prevent any change in shade on storing, as well as to increase the fastness.

After a careful drying, the goods are ready for the dry finishing. Particulars regarding any of the machines, chemicals, or dyes used can be obtained from any of the reliable manufacturers whose advertisements appear in TEXTILE WORLD.

* * *

Defects in Rayon Stocking

Technical Editor:

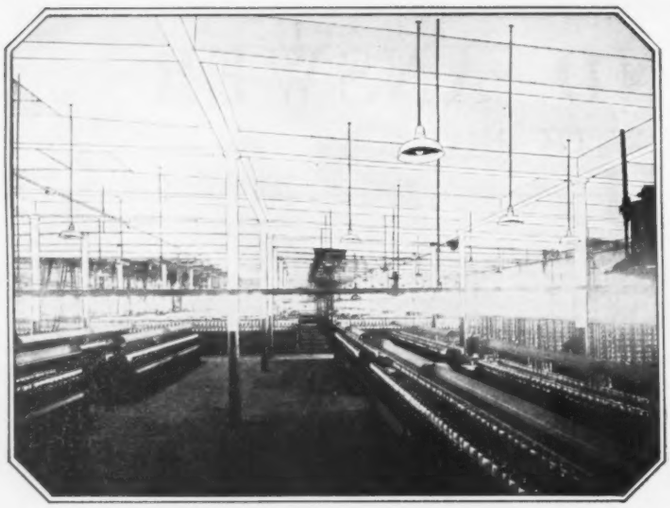
We are enclosing a sample stocking knit from rayon, together with a skein of the same material. In your opinion, are the "runs" in the stocking due to poor quality rayon, to imperfect knitting, or to improper handling, such as winding? Your opinion will be appreciated. (5538)

The sample has the appearance of being knitted from yarns with irregular or uneven tension. The upper part of the leg where the stitch is looser does not have noticeable variation, but close examination shows horizontal irregularities which seem to be due to stitch variations.

The ankle and foot show horizontal streaks and bands. Examination shows that these bands are composed of much tighter loops than the rest of the fabric. As the bands and streaks are irregularly spaced the knitting machine is not to be blamed, and so the cause must be the tension on the yarn.

Another thing which would lead to this same conclusion is the very irregular plating in the high splicing and part of the sole. The remainder of the sole is plated perfectly. This irregular plating is probably due to irregular yarn tensions and as the instep shows irregularities too, the rayon is probably causing the imperfect plating.

The source of the irregular tension is probably the bobbin on which the yarn is wound or the winding itself. If the yarn is wound in too soft a package, a skein will sometimes draw hard and pull the strand into the yarn already wound, so that it pulls off hard in un-



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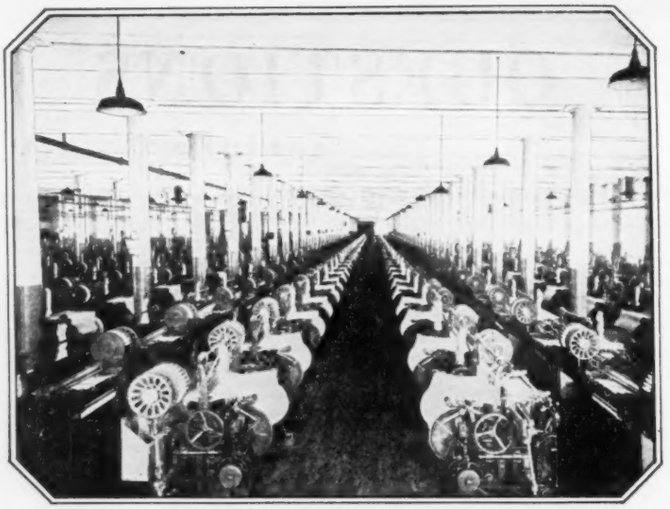

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Correspondence with Readers—Continued

winding. If a knot is not carried to the outside of the package, it will sometimes catch coils that were wound on after it. This is more likely to break the end than to cause the trouble shown here. Sometimes with long neck bottle bobbins, the yarn will drag on the neck when unwinding from the upper part of the conical surface and so be under greater tension than when ballooning away from the neck.

The drop stitches are probably due to the greater tension causing such a short stitch that the needle cuts the yarn. Since each break in the yarn comes at a point where the rayon seems to have been under greater tension, these "runs" are probably due to the needles cutting the yarn and so allowing the stitches to "run."

(May we call your attention to the fact that the mock seam yarn has a brown stain at regular intervals, indicating a stain on the cone of yarn used for this purpose. If the stocking is to be dyed light shades, this may easily make it a second.)

* * *

White Worsted Jersey Cloth Brown and Rotted

Technical Editor:

We would like to have you inform us of some of the reasons for white worsted jersey cloth becoming brown and rotted when used in bathing apparel. This does not happen very often according to our records, but occasionally we receive suits returned which are discolored and rotted. (5525)

This inquiry could have been answered more intelligently if the inquirer had informed us of the detailed method of bleaching. As it is, we shall have to go through the possibilities of such troubles in both methods of bleaching. From the nature of your trouble, we are inclined to the opinion that you are using the sulphur bleach. One of the most common of difficulties in a bleach or dyehouse is the carelessness of the operatives when weighing up or carrying sulphuric acid or caustic soda about the room. Should either sulphuric acid or caustic soda be spattered upon the material, stains and tendering will result. If these chemicals are concentrated, the discoloration and tendering will take place at once. If very dilute, the stains, especially in the case of sulphuric acid, will not show up in many cases until after storing.

In the case of sulphur bleaching, particles of iron rust may become incorporated in the fabric, either from overhead rusty pipes or from the knitting machines. If the latter, the trouble will be due to rusted needles or the use of an acid conditioning or lubricating oil which will dissolve the iron from the needles or other parts of the machine, the fabric picking it up in the oil. When scoured, the oil may be eliminated, but the iron remains.

When these spots containing iron are exposed to the sulphur fumes, the sulphur fumes, being acid when combined with the moisture in the fabric, dissolve and spread the iron present perhaps as a finely divided powder. This iron acts as a catalyzer, starts tendering, and, after aging, the sulphur dioxide plus the oxygen in the air continues the bad work, leaving a brownish stain. This same trouble may come from iron nails or parts in your sulphur house, especially if overhead. The moisture collecting thereon will drop upon the material, bringing with it dissolved iron.

In the case of the peroxide bleach, improperly dissolved sodium peroxide coming in contact with the fabric will tender and stain it; or improper mixing, leaving one portion on the acid side and one portion neutral or alkaline, will cause trouble. If the sodium peroxide is not properly neutralized and left slightly acid, some silicate of soda will be precipitated out as silicic acid, which, adhering to the fabric, will in aging tender and discolor the material.

If liquid hydrogen peroxide is used, this can also happen. Liquid hydrogen peroxide is acid; and, if the silicate of soda is added to this acid bath, silicic acid is thrown out. When preparing such a bleach bath, add enough ammonia to make slightly alkaline before adding the silicate of soda, presuming of course that the hydrogen peroxide is added to the bath first. In peroxide bleaching, beware of iron entering the bath either through the water pipe, steam pipe, or overhead rusted pipes. The same is true with the sulphur bleach.

* * *

Half Hose Thin and Irregularly Plated

Technical Editor:

Enclosed you will find two pairs of half hose made on 220 needle knitting machines on which I would appreciate advice concerning the silk and rayon portion of them. Each of these hose is about as tight as it can be knit on 220 needle machines with the usual .066 hook needle, yet they appear to me to be too thin in the leg and foot. Exhibit "A" is made from 150 denier artificial silk with one strand of 13/15 Japan tram. Exhibit "B" is made from a combination yarn. Aside from a few needle streaks which I know are in these hose, I would like you to offer criticism of same with suggestions for bringing them up to the standard for hosiery of this class. (5531)

These two samples are rather thin in the leg and foot portions, but some stockings are made in about this range for the trade desiring the thinner stockings. Real silk stockings on 220 needles use 10, 12 and 14 strand silks. This is about 140 to 200 denier. One manufacturer of silk and rayon half hose uses 170 denier rayon with one end of real silk. This stocking is, of course, a little heavier than the samples submitted. The stitch used for this heavier stocking is about the same as that used in the samples submitted, giving about the same wales and courses. The additional 20 deniers in size is sufficient to make a less sleazy fabric and gives a good stocking.

Of the two samples submitted, sample "A" shows irregular plating at the edge of the reinforcing section. To make a good stocking, this should be corrected to give a more perfect plating as in sample "B." The reinforcing yarns seem to be cut too close, as several of them have come through to the outside of the stocking. Leaving slightly longer ends should overcome this trouble.

Sample "B" is very satisfactory as far as mechanical construction is concerned but the yarn of which it is made does not seem as desirable as that in sample "A." In addition to this, the color does not seem so attractive a brown as in Sample "A." If the mechanical construction of sample "B" is combined with the yarns used in sample "A," or somewhat heavier yarns, the result should be a very satisfactory stocking.

Interest in London Shrunk Men's Wear

Editor, TEXTILE WORLD:

Will you kindly advise what the expression "London Shrunk" means?

In the making of men's clothes, does that mean that you have to buy more or less cloth, or the ordinary 3½ yds?

I see the above expression used more or less frequently by the selling agents. (D131)

The phrase "London Shrunk" as applied to woolen goods denotes a treating process involving cold water dampening and drying slowly without any stretching. This treatment is supposed to impart permanent shrinkage to the fabric.

Answering your question as to what effect this shrinkage would have on the quantity of fabric bought per suit of clothes to be manufactured—all we can say is that your patterns will determine that. If you have been accustomed to buy unshrunk fabrics and shrink them yourself or have them shrunk for you, you have probably found that the amount of shrinkage varies greatly with the type of fabric. The greatest part of the country's men's wear production is not London shrunk by the maker and it is only in recent seasons that there has been an increase in the number of makers of better class goods who are offering them in this condition.

* * *

Twisting Cotton Yarn

Technical Editor:

We are interested in the purchase of equipment for twisting 8s single cotton yarn 6 cord. We are interested in handling this number in the most efficient way and feel that perhaps there is better equipment than we are now using. We are now running 24 hrs. a day and will have to purchase in the near future and hope for immediate advice. (5539)

For the common 6-ply yarns use multiple winders and ring twisters. Another method would be to use spoolers, warpers, and twist from a beam. The inquirer does not say what he is now using or for what purpose the yarn is to be used, but we have sent the names of various machinery builders.

* * *

Chemical Retting Process for Flax

Technical Editor:

A number of years ago an article appeared in one of the newspapers regarding a new chemical process for flax reduction. I would be glad to hear from you whether or not this process is now in operation and with what success. We are considering the possibility of experimenting on a small scale with flax culture. (5537)

Many chemical processes have been proposed and a number of them given some publicity, so it is not possible to tell to which one you refer. Quite possibly it is the Peufaillit process which, as far as the writer knows, is the only entirely non-natural retting process that has been used on a practical scale. There are United States and foreign patents under the above name wherein the general nature of the process is disclosed, issued about 1911 to 1913, and possibly later. Unfortunately, the writer cannot now locate the United States patent number.

The process depends on an emulsion of petroleum (kerosene) in water and is worked in a kier under pressure. A better answer can perhaps be made if the inquiry can be put more definitely.

* * *

Weighting of Silk Crepe

Technical Editor:

I am writing to inquire if you have any information available relative to the formulas, methods and equipment (including detailed method of handling) used in the weighting of crepes, both silk and silk and rayon. (5511)

A detailed account of the weighting of silk piece goods was given in an article by H. R. Tisdale in the TEXTILE WORLD of June 28, 1924. The main point of difference to be noted is the fact that crepe silk has about 35 turns per inch and the weighting of this class of silk should not be carried too far. If we consider that the silk is boiled off from 16 oz. to 12 oz., we should only figure to add about 50% additional weight, that is, about 18/20 oz. return weight. A heavier weight than this will be apt to change the character of the silk. On account of the tight twist of the silk thread in crepe cloth, one must be very careful to wash the silk pieces very thoroughly after each operation of the weighting process.

* * *

Rayon Hose Tendered

Technical Editor:

I am having repeated trouble on this style of mercerized hose, with a plated 150 denier viscose rayon top. These hose are half bleached as below, and then dyed. If you can help me locate the source of this trouble, which is causing the rayon plating to be torn and tendered, I will greatly appreciate your assistance. These goods were carried through the following operation in a cypress boil-out tank (half bleach):

Entered in 140 gals. water at 110 deg. F., 2 lbs. solozone added slowly, stirred for 5 minutes, 1 lb. silicate of soda added to water, stirred well, heated to 170 deg. F., 3 lbs. of 50% T. R. oil added, boiled one hour, drained and washed well, placed in a monel metal paddle machine containing previously dissolved dyestuffs, boiled for 30 minutes, no salt used. (5508)

We have closely checked over your operation of half-bleach and dyeing of this material. As you no doubt know, the less time you can run rayon through the wet processes the better and stronger it will come out in the finished product. We would suggest, therefore, that you run the amount of chemicals used just as low as possible, also cut down on the boil to three-quarters of an hour instead of one hour. In dyeing, run the goods just under the boil instead of boiling them. Check up each step carefully, and make all possible speed.

Editor, TEXTILE WORLD:—

Thank you very much for your letter of September 2 and for your bother in telling the four manufacturers you mention about us.

If we do not find what we are looking for from among the four you mention or some that your Philadelphia office may suggest, we'll feel free to come to you again for further information.

Very truly yours,
CALIFORNIA CORDAGE CO.
By C. E. Hudson,
Mgr. Mop Dept.

PATERSON, N. J. S. D. Viviano, 126 Broadway, one of the principal incorporators of the Princess Print Plants, Inc., recently organized with a capital of 125,000, has been appointed representative for the company.

LANE CANVAS TRUCKS

FIG.27

LANE TRUCK.

A light, easy running, smooth carrier, but built for heavy duty work. Lane casters equipped with string guards prevent clogging.

Have stood the exactions of all departments of the Textile industry. One of our latest types to become standardized is the Dye House Truck. All metal galvanized. A solution to the dye house problem.

Write for Catalog No. 90

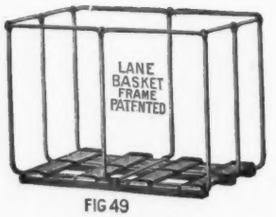
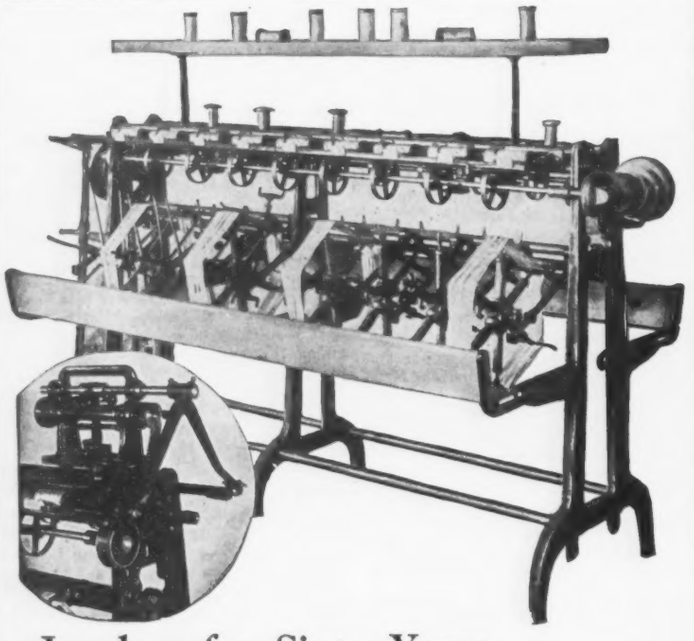


FIG 49

TRUCK & BASKET FRAME.

With slight modifications this cut illustrates the general construction of all Lane truck and basket frames. Lightness, flexibility, wonderful strength secured by this construction.

W. T. LANE & BROS.— Manufacturers —POUGHKEEPSIE, N. Y.



Leaders for Sixty Years

Atwood Winders and Spinners are made for manufacturers of fine fabrics.

The 4F Winder shown is specially equipped to wind Raw or Artificial Silk and other materials used by knit goods manufacturers.

We also make the 5B Spinner, a combination spinner and doubler for Silk, Artificial Silk and mixtures of Silk with cotton and worsted.

Specifications and prices on request

The Atwood Machine Co., Stonington, Conn.

Established 1864

Special Packing Service

UNIVERSAL SERVICE — WALTER R. ZIEGLER — RIVERSIDE, N. J.

Quick Deliveries

of

BANDS, LABELS,
BOX TOPS,
RIDER TICKETS,
SEALS AND TRANSFERS

WALTER R. ZIEGLER

RIVERSIDE, N. J. HIGH POINT, N. C.

MILL NEWS

COTTON

New Construction and Additions

*JONESBORO, ARK. It is reported that the board of directors of the Jonesboro Cotton Mills, Inc., have decided to proceed with the construction of their mill here, without further delay. An executive committee consisting of Herbert J. Bosler, R. E. Lee Wilson and F. W. Talor, has been appointed.

*BRUNSWICK, ME. The Cabot Mfg. Co. has completed the installation of 408 new Draper looms. Of this number 100 are broad and 308 narrow looms.

BUFFALO, N. Y. The Globe Woven Belting Co., Inc., has taken out a permit to build a one-story addition to its mill on Clinton St., estimated to cost $21,000, and will proceed with work at once.

*CHERRYVILLE, N. C. The Rhyne-Houser Mfg. Co. has final plans and specifications for the proposed mill addition, the building to be a two-story, 75 x 128 ft. structure, costing $30,000. There will be installed 5,000 spindles with electric power drive. Machinery has been ordered.

*CONCORD, N. C. The Locke Cotton Mills Co. has just completed the erection of brick and concrete boiler house. B. W. Bartholomew, Charlotte, N. C., was the contractor.

*DURHAM, N. C. The new plant of the Yarbrough Mills, Inc., will turn out some cloth early in October, according to E. S. Yarbrough, treasurer. The mill building is about complete and sprinklers, wiring, plumbing, etc., are being installed. Looms and other equipment are coming in and will soon be placed. The mill will make novelty cloths.

GRANITE FALLS, N C. A new textile plant will be erected at Granite Falls in the near future by A. A. Shuford and associates. The building will be two stories, 100 x 400 ft. A 300-ft. addition will also be built to the mill of the Granite Falls Mfg. Co. of which Mr. Shuford is treasurer.

HIGH POINT, N. C. The Highland Cotton Mills, Inc., will add several twisters to the equipment of their plant here.

KANNAPOLIS, N. C. The Cannon Mfg. Co. will build an addition to its office building.

*LINCOLNTON, N. C. Through error, the announcement was made that Boger & Crawford, spinners and mercerizers, with mercerizing plant at Philadelphia, were installing additional spindles and a gassing plant, together with a 200,000 gallon water reservoir at their plant in Philadelphia. This additional equipment is being installed at their mill here, where they have also completed the construction of eleven new dwellings for employes, and a new concrete road through the town.

*PAW CREEK, N. C. In connection with the contract for construction of houses by Kendall Mills, Inc., Thrift Division, at Paw Creek, plans for the development and extension of the village are being handled by E. S. Draper, Landscape architect and engineer, Charlotte and Atlanta. Plans provide for the location of new houses and new streets, park treatment, baseball field, etc.

*PHILADELPHIA, PA. The addition being erected to the plant of A. T. Baker & Co., Inc., Manayunk, manufacturers of velours and plushes is nearing completion and will be used as storage space by this company, centralizing their storage facilities which heretofore have been scattered in several different locations. It cost approximately $50,000.

*GREENVILLE, S. C. The Piedmont Plush Mills, Inc., whose incorporation and plans for building a plant here for the production of pile fabrics, drapery and upholstery goods, were recently noted, will have an equipment of 24 plush looms, dyeing and finishing machinery. It is expected to begin operations about the middle of December.

*MONTMORENCY FALLS, QUE., CANADA. The installation of machinery in the new addition to the Montmorency Cotton Mills, of the Dominion Textile Co., Ltd., will begin early in January. Sir Charles Gordon, president of the company, states that nothing has been decided as yet in connection with the Dominion company's entry into the rayon field. The company is still investigating and it is expected that it will go into the production of the new line.

Fact and Gossip

FLORENCE, ALA. W. M. Richardson, president of the Florence Chamber of Commerce, has departed on an extended trip through the east and middle west in the interest of the Chamber of Commerce to start a campaign for more industries for Florence.

SELMA, ALA. It is reported that the California Cotton Mills Co., Oakland, Cal., has purchased the new Canebrake Cotton Mills, in Uniontown, Ala., the Sunset Textile Mill and the Alabama Textile Mills, in Selma, Ala. The recently acquired mills have been operated for sometime by interests allied with the California Cotton Mills.

BIDDEFORD, ME. Operatives of the Pepperell Mfg. Co. are rejoicing over the announcement of Agent Howard R. Whitehead that commencing Monday, Sept. 14, the mills will run on a full time schedule at the present scale of wages. There is a possibility that the employment of night crews may be necessary.

BIDDEFORD, ME. The Pepperell Mfg. Co. is remodeling its office building and will install all modern office appliances.

BROCKTON, MASS. Everlastik, Inc., anticipating a strike by 75 weavers in the gore department because of reduced wages, notified the weavers Sept. 9 that their services were no longer required. Arthur Carter, manager of the local plant, said that he had no information regarding the future policy of the company in reference to these weavers.

BESSEMER CITY, N. C. Frank and Robert Goldberg, president and treasurer, respectively, of the American Cotton Mills, Inc., have purchased the McLean

* Indicates previous mention of project.

Better Lubrication at Less Cost per month

Regular Repeat Orders are this lubricant's best endorsement!

There is deep significance in the fact that over 70% of the leading mills throughout the country now use regularly—

TRADE MARK NON-FLUID OIL REGISTERED IN UNITED STATES PATENT OFFICE

MODERN TEXTILE LUBRICANTS

These mills place regular repeat orders for NON-FLUID OIL because they get the results they are after — results unobtainable with any other lubricant.

The outstanding feature of NON-FLUID OIL is its adhesive quality—its ability to stay in bearings.

This means that NON-FLUID OIL gives constant and positive lubrication—

And that NON-FLUID OIL keeps in the bearing and off the product—an important point when you consider the loss sustained by many mills through oil-stained goods.

And again, NON-FLUID OIL lasts much longer in the bearing than liquid oil and therefore *costs much less for lubricant.* This is a clear saving for any mill.

To help you get acquainted with NON-FLUID OIL we send free sample and bulletin, "Lubrication of Textile Machinery", on request—write today.

N. Y. & N. J. Lubricant Co.
Please send bulletin, "Lubrication of Textile Machinery" and samples of NON-FLUID OIL for purposes checked below:—

☐ PICKERS ☐ CARDS ☐ SPINNING FRAMES
☐ LOOMS ☐ TWISTER RINGS ☐ BALL BEARINGS
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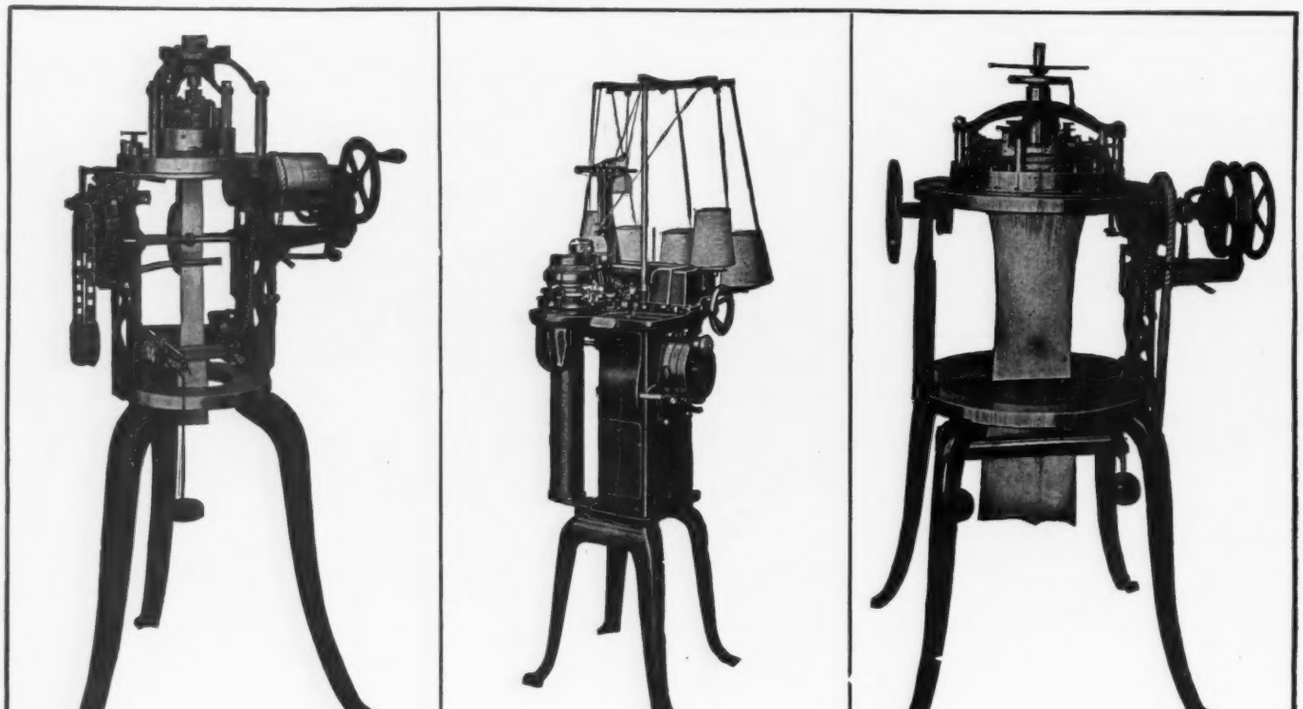
PROVIDENCE, R.I. NEW ORLEANS, LA. GREENVILLE, S.C.



RIBBER HOSIERY MACHINE BODY MACHINE

BRINTON KNITTING MACHINES

The Brinton Line of Knitting Machinery is complete. And each machine in the line is the very best we know how to manufacture for that particular kind of work. That these machines have become so popular is due entirely to their ability to turn out a product that possesses all the qualities of a well knitted article, and to accomplish this at an unusually low cost.

Samples, prices and particulars on request

FOREIGN AGENTS

Great Britain and the Continent
Wildt & Co., Ltd., Leicester, England.

Australia
J. H. Butler & Co., Sydney—Melbourne.

China and Japan
Elbrook, Inc., 51 Kiangse Road, Shanghai, China.

South America
Santiago Scotto, Galeria Guemes, Buenos Aires, Argentine Republic.

H. BRINTON COMPANY, Philadelphia, Pa.

Mill News—Continued

mills here, which were operated by them under lease for some time as the Southern Cotton Industries, Inc. A corporation known as American Cotton Mills, Inc., Plant No. 2, has been chartered to operate the McLean mills. The capitalization of the new corporation is $250,000.

STANLEY, N. C. The water supply here continues to dwindle and the Lola Mfg. Co. has found it necessary to construct a larger dam at the source of its supply about one mile from the plant, where water is obtained from the springs. These springs have never been known to go dry and it is expected that they will take care of the needs during the next several weeks.

PHILADELPHIA, PA. An application for a charter of incorporation will be made Oct. 5, for a company to be called Toody Sanitary Fabrics Co., Inc., to engage in the manufacture of sanitary textile fabrics. Sterling & Willing, 213 S. Broad St., are the attorneys in charge.

WOOL

New Construction and Additions

*CHICAGO, ILL. The Oscar Heineman Corp., Armitage Ave., has awarded a contract to the R. C. Weiboldt Co., Chicago, for its proposed four-story addition, 126 x 129 ft., to cost about $300,000, with equipment. The front will be pressed brick, stone trim. George C. Nimmons & Co., 122 S. Michigan Ave., are architects.

SANGERVILLE, ME. The Dumbarton Woolen Mills recently added one new set of cards and four spoolers to their equipment and are now installing a new duster.

MALDEN, MASS. The Malden Spinning & Dyeing Co. plans to install four new mules in its plant.

Fact and Gossip

CENTRAL VILLAGE, CONN. The Farnsworth Mills, Inc., will resume operations Sept. 21 after being shut down for many months. It is planned to operate at full capacity.

SOUTH WINDHAM, ME. The mill of the Windham Mfg. Co. which has been running part time for a number of months, will be shut down for an indefinite period.

CHERRY VALLEY, MASS. Work of strengthening the wall of the main mill of the Cherry Valley Woolen Co., and other repairs and renovations are in progress preparatory to the reopening of the plant. Although the new owners of the former Olney Woolen Mills have been in possession of the property since May 1, 1924 they have never started operations but hope to shortly.

NORTH CHELMSFORD, MASS. Silesia Mills of the U. S. Worsted Corp. have been obliged to increase the working schedule because of orders on hand. A night force is employed in some departments and operatives are also working Saturdays. The George C. Moore Wool Scouring Mills are also working Saturday afternoons to keep abreast of orders.

PHILADELPHIA, PA. An application for a charter of incorporation will be made Oct. 5 for a company to be called Benrath, Inc., to manufacture and process textile materials, buy and sell worsted yarns and fabrics of all descriptions. Benj. Golder, is the attorney in charge.

* Indicates previous mention of project.

KNIT

New Construction and Additions

*LOS ANGELES, CAL. The Sunset Silk Hosiery Mills, 423 Grosse Building, have awarded a contract to J. C. Bannister, 6331 Hollywood Blvd., for the erection of their plant on the San Fernando Rd., near Edwards Ave., consisting of a group of three buildings to cost approximately $85,000, with machinery. Foundations will be laid at once. M. H. Merrill & Co., Los Angeles are engineers.

COHOES, N. Y. It is reported that Riberly & Berocher (a partnership formed by Joseph Riberly and Paul Berocher) have purchased machinery and will soon begin the manufacture of knitted rayon fabrics here.

LONG ISLAND CITY, N. Y. The Mojud Hosiery Dye Works, 200 Fifth Ave., New York, have awarded a general contract to the Fisher-Williams Corp., 103 Park Ave., for the erection of a one-story plant at Washington and Eighth Aves., Long Island City, to cost about $32,000. Lockwood, Greene & Co., New York are architects.

*WINSTON-SALEM, N. C. Plans have been completed and bids called for the erection of a new plant for the Hanes Hosiery Mills Co. The new building will be 500 ft. x 125 ft. and will be located in the northwestern section of the city on the Norfolk and Western Railroad. It is expected to have the new plant completed in nine months, when the company will move from its present mill on Second and Marshall Sts., which it has outgrown. The new building will be located on a four acre site and as the building is to be two stories high the capacity of the Hanes plant will be more than doubled. Lockwood, Greene & Co., Charlotte, are the engineers in charge.

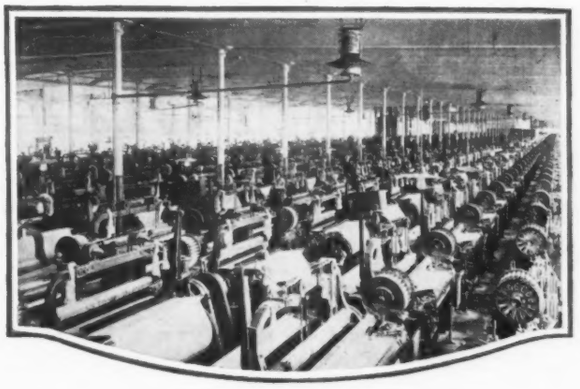
WINSTON-SALEM, N. C. The P. H. Hanes Knitting Co. has awarded contract to T. C. Thompson & Bros., Charlotte, N. C., for construction of a storage warehouse to have three compartments, each 75 x 200 ft., steel and concrete construction, to cost approximately $80,000. J. E. Sirrine & Co., Greenville, S. C., are the engineers in charge.

LUZERNE, PA. The Absorbent Knitting Co., Inc., a new concern, is starting operations in a plant at Carpenter and Charles Streets. The company will make a line of children's novelty seven-eighths hose in checks, blocks and stripes from top to toe, with fancy cuffs; also men's novelty socks and infants' ribbed hose. Production will be about 100 dozens a day at the start. The company, of which R. C. Werkhuser is president, is looking for a selling agent.

READING, PA. According to a report, the Busy Bee Hosiery Co. plans to build an extension to its plant here.

READING, PA. The Noe Equl Hosiery Mills, 12th and Bern Sts., are said to be arranging for the early construction of a three-story addition to their plant.

*CHATTANOOGA, TENN. The Moun-



No more oil stained fabrics

—*if you lubricate your looms with Blanquol Crescent Loom Oil*

FOR years, textile mills have sought a so-called stainless oil—an oil that could be readily and completely scoured from fabrics and leave no trace of stain.

The technologists of the Tide Water Engineering Bureau, after years of tests and experiments, have created just such an oil. It is called Blanquol Crescent Loom Oil—a compounded oil, skillfully blended, that scours readily and completely, leaving the fabric clean and unstained.

Tide Water is proud of the distinguished list of textile mills who use and enthusiastically endorse Blanquol Crescent Loom Oil. Why not have one of our Staff Engineers call at your office and add your mill to this list?

The FILM of PROTECTION

—for textile machinery

IN their application to each phase of Textile Mill lubrication, the lubricants comprising the Tide Water Power Group form the "film of protection," ***thin as tissue, smooth as silk, tough as steel.*** The application of the Tide Water Power Group to your machinery will give you truly economical lubrication—maximum power, uninterrupted operation and increased production.

Tide Water Power Group

Dynol Engine and Turbine Oils
Grenol Steam Cylinder Oils
Tycol Lubricating Greases
Clarol Machinery Oils
Dynol Spindle Oils
Magic Wool Oils
Blanquol Crescent Loom Oil

TIDE WATER LUBRICANTS

TIDE WATER OIL SALES CORPORATION

ELEVEN BROADWAY NEW YORK

"FULL FASHIONED HOSIERY MANUFACTURERS"

You can now obtain the
IDEAL COMBINATION of

HIGH SPEED and PERFECT WINDING of 5 THREAD SILK

and all other threads, also cotton yarns

by using the

ALTEMUS 2-B MODEL No. 25 F.F. WINDER

This latest and EXCLUSIVE Altemus Winder is the result of 60 years experience in making Textile Machinery. It is the "last word" in Winding Efficiency for Full Fashioned Manufacturers.

A Special Feature (Patented) of this machine is the Mechanical Builder Guide, which DOES NOT TOUCH THE YARN, during any stage of the building-up of the package. Another feature is our new device, (Patented) which guarantees a definite percentage of emulsion application to the yarn. This eliminates the poor results usually obtained thru guess work.

This new Model 2-B No. 25 F. F., operating at 1600 R. P. M. spindle production, eliminates tight and loose stitches, seconds and press-offs. It lays yarn accurately and smoothly—and last, but not least, the release or let-off of the yarn while knitting counts for quality fabric.

Be convinced of the real value of this machine, by sending yarn for sample winding, —or, if you so desire, we will send you copies of commendatory letters received from users of Altemus Winders.

ALTEMUS REPRESENTATIVES

H. G. Mayer, Southern Agent
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Established 1865

WINDERS
SPOOLERS
WARPERS

Textile Machinery

BEAMERS
& KINDRED
MACHINERY

American St. below Lehigh Av., PHILADELPHIA, PA.

Mill News—Continued

tain City Knitting Mills have awarded contract to A. F. Hahn, Chattanooga, for construction of the three-story, 60 x 80 ft. addition to their plant. The addition will represent and investment of about $50,000. Of this sum about $20,000 will be for machinery and $30,000 for construction of the building. W. H. Sears, Chattanooga, prepared the plans.

Fact and Gossip

AMSTERDAM, N. Y. The Adriutha Silk Fabric Co. has disposed of its equipment of six looms to the Foster & Gifford Silk Mills of Gloversville. The Adriutha company has not made any announcement regarding its future plans.

PHILADELPHIA, PA. Machinery and equipment of the Allrite Knitting Mills, Inc., 2128 E. Somerset St., misses' and children's ribbed hosiery manufacturers, will be sold on the above premises Sept. 22, at 10 A. M.

PHILADELPHIA, PA. Appel-Hall Knitting Mills, 5212 Wakefield St., Germantown, sweater and knit goods manufacturers, have been declared involuntary bankrupts, adjudication having been granted. Walter C. Douglas Jr., is the referee appointed.

PHILADELPHIA, PA. Notice has been given that A. Korobov, heretofore trading as Cosmos Knitting Mills, at 321 N. 8th St., manufacturing mufflers and other knit-wear, has sold this business to S. A. Effenberg and J. Korobov, who will carry on the business along the same lines as heretofore, and under the same name.

SILK

New Construction and Additions

*CHARLOTTE, N. C. Veritas Silk Mills, Inc., West New York, N. J., have decided upon an initial investment of $60,000 for their proposed plant here. They will install an equipment of 40 looms for weaving broadsilks. Lockwood, Greene & Co., Charlotte and Boston, are the engineers in charge. The J. A. Jones Construction Co., Charlotte, has the building contract.

*FREELAND, PA. The Washington Silk Co. is asking bids on a general contract for a one-story mill addition to be 150 x 332 ft. J. B. Chamberlain, Hazleton, Pa., is architect.

CENTRAL FALLS, R. I. The Mil-Mar Silk Mill, 4 Cross St., manufacturers of broad silks and silk novelties, has an equipment of 168 looms, five warpers and auxiliary machinery.

Fact and Gossip

SHELTON, CONN. Sidney Blumenthal & Co., silk velvets, etc., has brought suit against the Salts Textile Co. of Bridgeport for alleged infringement of trademarked fabrics. The court has been asked to ascertain the amount of damage in a bill of equity filed with the United States District Court at New Haven.

HOLYOKE, MASS. The mill property and equipment of the Goetz Silk Mfg. Co., was sold under foreclosure proceedings on Sept. 11 to the mortgagees, represented by Wm. E. Nolan, for a total of $152,300, netting $97,000 above the first mortgage of $50,000 and taxes of $5,300. The purchasers include the Holyoke National Bank, the Holyoke Savings Bank, Morimura Arai & Co., Mitsui & Co., Ltd., and the American Raw Silk Co. The only other bidder was the McCallum Hosiery Co. The company's total indebtedness is said to be $176,000. An early resale of the property, which includes 82,144 sq. ft. of land, is expected.

* Indicates previous mention of project.

RAYON

New Construction and Additions

MARCUS HOOK, PA. The Viscose Co. has taken bids for a one-story addition to its boiler plant, and will award contract and proceed with work at an early date. The Ballinger Co., Philadelphia, is architect and engineer.

*CORNWALL, ONT, CANADA. It is reported that all machinery is now in place in the new mill of Courtauld's, Ltd., and will soon be in full operation.

Fact and Gossip

HOLYOKE, MASS. Experiments are being conducted by the Farr Alpaca Co. with rayon cloth for linings for men's and women's clothing but as yet the product has not been placed on the market. Experiments are said to be progressing satisfactorily.

NEW YORK, N. Y. The U. S. Rayon Corp., recently incorporated under Delaware laws with capital of $10,700,000 has succeeded to the business of Senor & Wertheim, Inc., and its subsidiaries the Lustreyarn Ribbon Co., Seacoast Yarn Co. and Belmar Braid Mills.

DYE, BLEACH AND FINISH

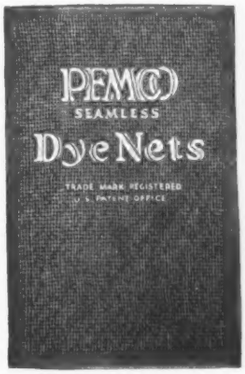
New Construction and Additions

*BALTIMORE, MD. Woodberry Dye Works, recently reported organized, have secured a location in the Munson buildings, on Key Highway. The plant will be operated under the direction of Thomas Craig, superintendent.

LONG ISLAND CITY, N. Y. The new plant of the United Textile Print Works, Inc., on Fourth Ave. between Washington and Webster Aves., is completed and machinery is now being set up. The plant will have four printing machines, two of which, together with necessary auxiliary equipment, are installed and it is planned to start operations in the new quarters Oct. 1. Designs are now being received for engraving. Additional equipment of jiggs, oval reel dye becks and tenter frame is to be purchased. R. W. Jacoby is superintendent of the plant

*CHATTANOOGA, TENN. Excavation work is now under way for the plant of the Central Franklin Process Co. here. The plant, designed by J. E. Sirrine & Co., Greenville, S. C., will have three buildings, the largest of which, a 70x150 ft. structure, will house shipping and winding departments; the second, 82x101 ft., will be the machine and dyeing rooms, and the third building, 42x41 ft., the power plant. The majority of the subcontracts have been awarded to local contractors. The new plant is so designed that its capacity may be doubled at any time.

Just incidentals BUT—



Too often are dye nets looked upon as mere incidentals—nothing more. True, they are incidentals but they can unmake the whole dyeing process. A ripped seam often raises havoc—out goes the hosiery into the bath where it quickly forms a tangle. You know what a tangle means — possibly seconds, off shades—at the very least, loss of costly time.

"Pemco" Seamless Dye Nets give your processed hosiery ample protection. The woven construction is entirely sound. The seams are all closed up on the loom. The substantial meshing prevents harmful rubbing while the goods are weak.

Write now for samples and full information.

PENDLETON MFG. CO.
Autun, S. C.

"PEMCO" *SEAMLESS* DYE NETS

SILK OIL
TRADE MARK

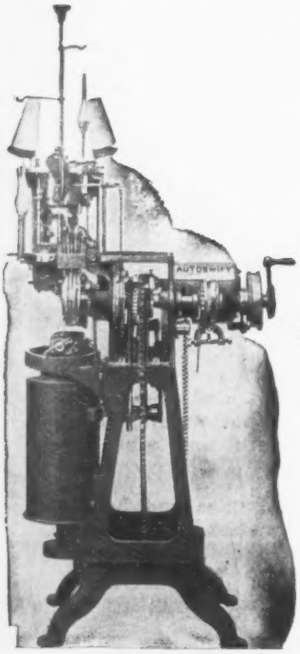
for the treatment of gum and artificial silk of all kinds and natures. For the treatment of silk in the throwing, knitting and weaving mills of both artificial and gum silk.

Every drum is tested before it is shipped and must be perfect. It is absolutely uniform and will give the same uniform results each and every time, will not deteriorate in any way no matter how long it is kept in stock.

We will ship you prepaid a sample drum strictly on approval on request.

PHILADELPHIA SILK OIL COMPANY
Third and Dock Streets
Philadelphia, Pa.

WM. SPIERS
LEICESTER, ENGLAND



AUTOSWIFT

Model "R"
Ribbed Hose

19-9, 16-5, 9-3, 6-6 Wide Plain Top

Ribbed Half Hose

1-1 top, 6-3, 5-1 or 3-1 leg.

Full range of Diameters for ¾-Hose and Ribbed Socks with or without plaiting attachment.

Any rib which divides can be made.

Also checks and stripes.

Model "P"
Plain Half Hose

1-1 Rib Top, Plain Leg, High Spliced Heel and Sole.

Full Range of Diameters for Half-Hose, ¾-Hose and Children's Socks.

With or without Plaiting Attachment.

Price and particulars on request. Needles and parts kept in stock at Needham, Mass.

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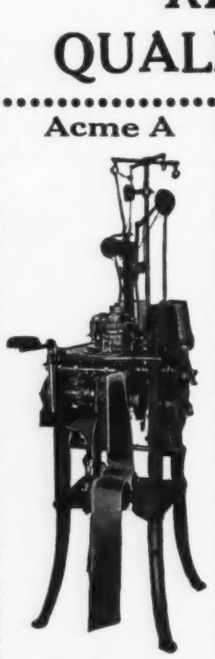

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Work Clothing Production

WASHINGTON, D. C., Sept. 14, 1925. —The Department of Commerce has announced statistics on work clothing for July, 1925. A comparative summary for 158 identical establishments reporting for July and June, 1925 and 1924, follows. These statistics are for outer work garments (overalls, unionalls, coveralls, two-piece suits, work pants, etc.,) and do not include data on work shirts.

ITEM	NUMBER OF GARMENTS (DOZENS)						
	Denims			Drills	Khaki	Duck	All other
	2.20 and other W. B.	2.40–2.45 & heavier D. & T.	2.50 and lighter D. & T.				
GARMENTS CUT							
July, 1925	112,926	17,827	14,183	17,336	20,991	4,293	25,359
June, 1925	150,837	24,657	15,472	19,348	29,483	5,290	31,934
July, 1924	66,902	18,726	9,125	15,051	16,260	3,860	22,204
June, 1924	79,863	15,852	13,115	13,169	8,810	4,838	17,531
GARMENTS RETURNED							
July, 1925	728	158	154	111	122	45	360
June, 1925	1,028	202	247	129	228	68	482
July, 1924	600	259	464	112	252	58	341
June, 1924	1,173	611	114	136	152	87	807
GARMENTS SHIPPED							
July, 1925	123,634	18,004	11,309	12,440	19,092	3,110	21,312
June, 1925	121,406	19,724	13,159	18,053	21,875	2,674	26,117
July, 1924	82,960	20,410	10,593	13,091	14,402	3,156	20,105
June, 1924	82,473	19,112	12,606	14,015	17,906	3,040	21,348
STOCKS ON HAND							
July, 1925	167,067	44,911	10,821	29,588	28,542	10,163	44,548
June, 1925	179,934	41,247	11,704	27,732	30,907	9,870	44,645
July, 1924	159,258	42,829	15,441	31,695	29,903	9,510	48,519
June, 1924	191,796	41,443	17,279	30,183	28,440	11,009	46,865

Growth of Wool Cooperatives

(*Continued from page* 34)

wool in 1924, compared with 19,647,861 lbs. in 1923 and 10,922,700 lbs. in 1922.

Evidence of the extent to which wool cooperation has been consolidated in recent years is given by the fact that 68% of the total quantity of wool handled cooperatively in 1924 was handled by seven associations. On the other hand, 22 small associations handled only 4% of the total. The seven associations whose operations accounted for 68% of the total wool sold cooperatively each handled more than 500,000 lbs. Thirty-eight other associations handled less than 500,000 lbs. each.

Regional or State-wide cooperative marketing of wool started about 1918. Its advent was hastened by the fact that during the war the Government fixed prices for wool and urged growers to assemble their fleeces at local points for shipment in carlots to central markets. As prices were fixed growers had a strong incentive to hold distributing costs down to the minimum. State-wide wool marketing associations accordingly were organized in 1918 in Ohio, and Michigan, and in the following year in Illinois, Iowa and Kansas. In 1920 State-wide pools were formed in Maine, North Dakota and Wisconsin, and in 1921 pools were organized in Indiana, Virginia, and southwestern Texas. In some cases these pools were run at first without formal organization among the growers. Later, however, most of them developed into special associations functioning solely in wool marketing.

In 1921 what is now the Pacific Cooperative Wool Growers Association was formed at Portland, Ore. Intended at first to serve only the wool growers of Oregon, it achieved such success that its field of operations was rapidly extended to include Washington, Idaho, Wyoming, Nevada and California. This association warehouses the fleeces of its members at Portland and San Francisco, grades and sorts the wool, scours some of it, and makes sales direct to the textile mills. It had a membership of 2,695 persons in 1924, and handled 3,500,000 lbs. of wool in that year. Several other large associations have had a rapid growth likewise.

Several experiments in cooperative wool distribution by sales agencies at strategic points have been made. One such agency, known as the National Wool Warehouse & Storage Co., was set up in Chicago in 1909, with a capital largely contributed by wool growers in a number of western States. This concern sold wool for cooperative associations in Illinois, Iowa, Kansas, Montana and South Dakota, and also handled individual consignments from other States. It became embarrassed financially, however, because of over advances made on wool received in 1920, and its assets are now being liquidated. Recently another sales agency planning operations on a nation-wide scale has been formed with headquarters at Helena, Mont. It proposes to furnish grading and selling service for regional and State pools, and also for independent local associations and individual wool producers. This concern is known as the National Wool Exchange. Several other large selling agencies are furnishing similar service.

*BELMONT, N. C. The Belmont Processing Co. expects to begin production in December, according to latest reports, with a weekly capacity for handling 100,000 lbs. of yarn. This output will be doubled during 1926 by duplicating the initial equipment.

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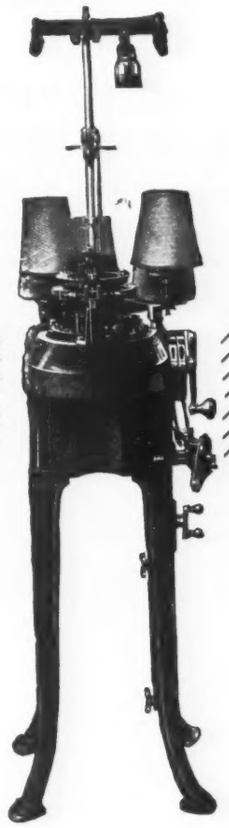

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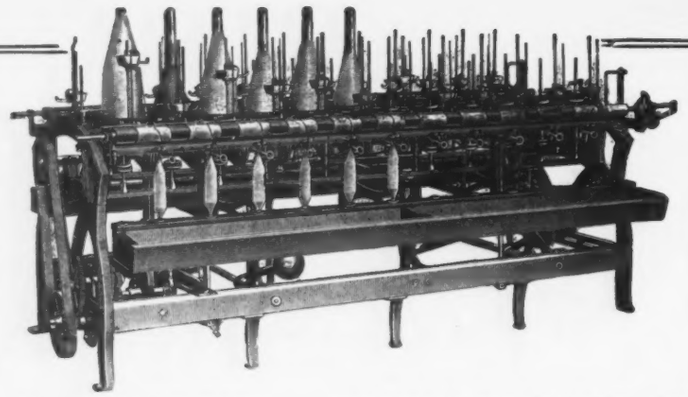

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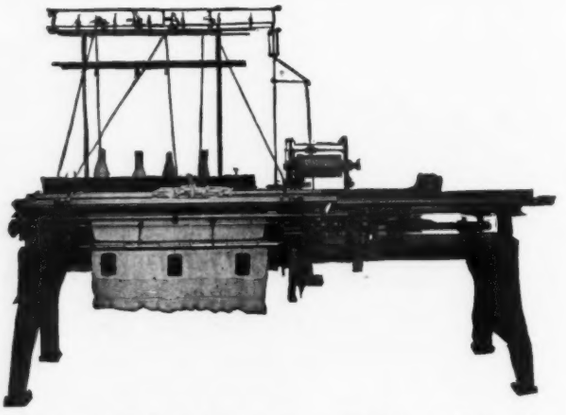

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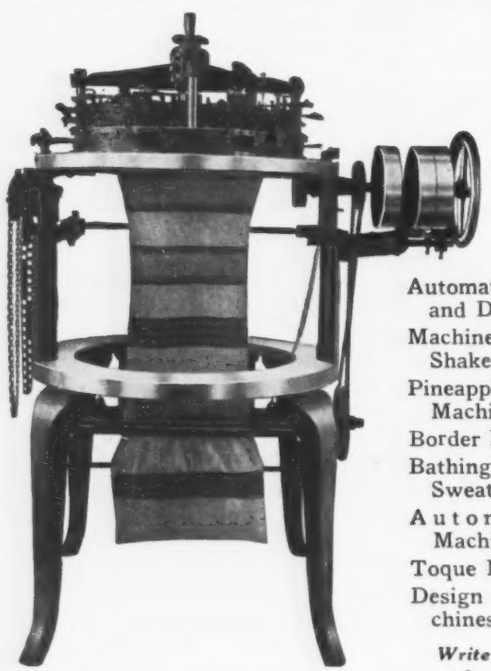

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KNIT GOODS MARKETS

Further Expansion in Hosiery Trading

Still More Increase Expected in Next Four Weeks—Raw Silk Market a Problem

Opinions differ as to the extent of the improvement in the primary hosiery market since Labor Day but there is no disagreement on the fact that there has been an increase in business. Particularly is this true in the case of further orders on seamless goods for fall. Furthermore present indications in the trade point to the probability of greater expansion during the next two weeks. Unless all signs fail, the market has started on a new period of activity.

Confidence in the future of the hosiery industry has not been diminished but is rather strengthened as a result of developments during the last week or ten days. Coupled with actual improvement in hosiery buying itself, there has been a coincidental brightening of the entire industrial situation and even ultra-conservative factors are expressing optimism at the present time.

There is still plenty of conversation about the probable prices on full fashioned hosiery for the first six months of next year. Reports and counter-reports are heard of early and late openings, and likewise of higher and unchanged prices. Thus far the market has had to take it out in talk because there has been no authoritative intimation of the outcome.

Linked up with this question is the problem of raw silk prices. It must be admitted that some of the confidence of those who have been predicting a decline has been shaken. The continued firmness of this market and the apparently well-based reasons for it have tended to arouse doubt even in the minds of those who were most positive that weakness would develop between now and the end of the year.

Irrespective of such doubt as this raw material situation has aroused, the full fashioned situation itself continues fundamentally sound with every indication of further expansion during the next several months. Expressions of doubt as to the permanency of the present demand for full fashioned are discounted in well-informed circles.

Hosiery Notes

The ten colors most in demand during the week ending Sept. 12 at the shops of the Gotham Silk Hosiery Co., Inc., were, in the regular lines: Black, grain, beige, white, medium gray, Piping Rock, French nude, gravel, flesh, atmosphere. In sheer hosiery, the colors by order of preference were: Grain, beige, French nude, flesh, black, dark gray, atmosphere, cannon, Piping Rock, toast.

* * *

It is possible that Chattanooga will add another hosiery mill to its industrial group as Charles H. Bacon, president of Charles H. Bacon & Co., operating six hosiery plants in Eastern Tennessee, has announced that headquarters of his company will be moved to Chattanooga and that a new plant will be established there, possibly in East Chattanooga.

* * *

The Hanes Hosiery Mill Co., Winston-Salem, N. C., will erect a new plant in that city, the building to be 500 x 125 ft. The new plant is expected to be completed in nine months, when the company will move from its present mill which it has outgrown. The new building will be located on a four acre site and as it is to be two stories high the capacity of the Hanes plant will be more than doubled. Lockwood, Greene & Co. engineers, of Boston, are in charge of the construction through their Charlotte, N. C., office.

* * *

The Burlington Hosiery Mills, Philadelphia, operated by the Marshall Field Mills Corp., are installing 25 additional seamless machines, giving them, with this addition, 236 seamless, 16 jacquard and 28 full fashioned machines.

* * *

Plans for the erection of the Soddy Hosiery Mills at Soddy, Tenn., to be operated by the Richmond Hosiery mills, of Rossville, Ga., are in the hands of J. E. Sirrine & Co., engineers, of Greenville, S. C., and Chattanooga, Tenn. Plans call for a two story building, 60 x 150 ft. to house 225 knitting machines and 50 loopers on the second floor, with finishing and shipping room on first floor.

French Full-Fashioned Machinery Manufacturers Here

Representatives of the largest manufacturers of full fashioned hosiery machines in France recently arrived in New York for the purpose of making a thorough investigation of the full fashioned hosiery and machinery situation in this country. Their company has never exported machines to the United States.

Raymond Couturat, administrateur délégué of the Societe Generale de Bonneterie, and Louis Cixier, director of the Societe, who are making their headquarters at the Hotel Chatham, New York, plan to visit a number of representative mills making both women's full fashioned goods and fine seamless half hose. They believe domestic manufacturers will be interested in their fine gauge machines for women's goods, and in their cuff machines. The latter have been adopted by a number of European manufacturers of fine seamless half hose who desired to increase the quality of their product through the use of full fashioned cuffs.

A director of the Societe Generale de Bonneterie made a preliminary investigation of the domestic market several months ago, his favorable report being responsible for the visit of the above gentlemen.

Knit Underwear Production

WASHINGTON, D. C.—The Department of Commerce announces the production of knit underwear for the months of July and June, 1925, based on reports received from 153 identical establishments. A further subdivision of the data has been made for the purpose of presenting separate statistics of 100 identical establishments manufacturing cotton knit underwear exclusively.

Due to the fact that a number of companies have been unable to segregate unfilled orders by classes, as requested on the new schedule form used in collecting the July statistics, the data relating to this item in July will not be published.

More Confidence in Underwear Market

Better Undertone Noted than Has Been Apparent in Years—Cotton Recovery a Factor

The increasing air of confidence in the knit underwear market impresses the impartial observer as a refreshing change from the attitude which has characteriized that trade for the last several years. This statement is not prompted by any remarkable development of business since Labor Day but by an intangible strengthening of the undertone throughout the market. It must be admitted that there was much about the atmosphere of the knit underwear industry during the last few years that suggested lack of confidence in its future by manufacturers themselves. Today such pessimism is conspicuously absent and even conservatives admit that the outlook is brighter than since 1920.

Not only does comparison with last year reflect improvement but it is learned on good authority that certain heavyweight mills have done a larger business recently than at any time in their history. Recognition of hopeful signs of this type is changing the whole complexion of the market.

The recovery of the raw cotton market has been a further strengthening influence. Although underwear manufacturers did not regard the decline as a serious factor in future development, it injected a temporarily disturbing element into the situation. The quick recovery of this decline, with the aid of the Government crop report, has revived belief in the stability of the cotton market for the immediate months and in the possibility of establishing a fairly definite trading range for future business.

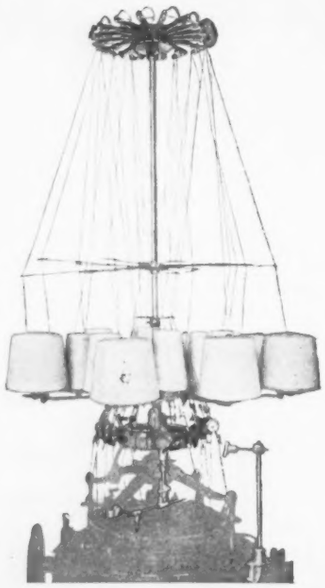
From the style standpoint, encouraging reports continue to be heard regarding the possibilities of athletic knit underwear. This is not

PRODUCTION FOR JULY AND JUNE 1925 (DOZENS)

ITEM		Men's		Women's		Boys'		Misses'		Children's and Infants'
		Union suits	Shirts and drawers	Union suits	Shirts and drawers	Union suits	Shirts and drawers	Union suits	Shirts and drawers	All kinds
Production of **153** *identical establishments (All classes of knit underwear combined):**										
Winter —	July	201,412	129,279	49,494	44,010	47,170	1,732	32,909	25,499	78,386
	June	192,576	139,254	45,410	48,634	52,579	3,625	39,887	26,832	61,088
Summer —	July	72,162	77,204	73,239	158,329	1,663	398	1,002	17,493	21,958
	June	72,983	82,975	143,528	167,257	7,630	1,429	2,288	26,052	37,289
Total —	July	273,574	206,483	122,733	202,339	48,833	2,130	33,911	42,992	100,344
	June	265,559	222,229	188,938	215,891	60,209	5,054	42,175	52,884	98,377
Production of **100** *identical establishments manufacturing cotton knit underwear exclusively:*										
Winter —	July	148,017	110,378	20,186	24,094	39,243	896	25,656	19,966	40,428
	June	149,279	124,600	12,672	22,030	40,111	2,060	28,392	18,076	20,097
Summer —	July	38,071	51,749	24,903	105,950	953	334	360	13,975	14,539
	June	43,581	53,968	103,040	99,243	4,356	1,160	1,196	13,431	26,285
Total —	July	186,088	162,127	45,089	130,044	40,196	1,230	26,016	33,941	54,967
	June	192,860	178,568	115,712	121,273	44,467	3,220	29,588	31,507	46,382

* Includes production of 100 identical establishments manufacturing cotton knit underwear exclusively.

Crawford



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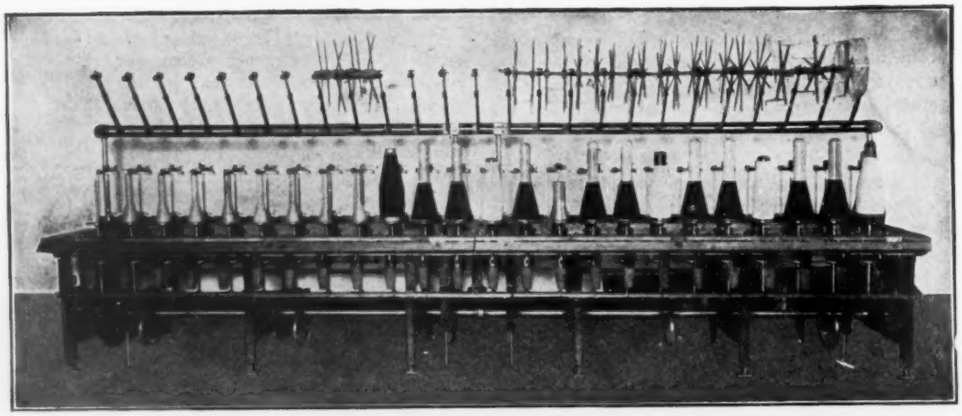

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Knit Goods Markets—Continued

as important from the standpoint of the particular manufacturers of this type as it is from the general consideration that the introduction of progressive ideas into underwear manufacturing and merchandising bears speedy returns.

Underwear Notes

The United Underwear League of America reports that the demand for high grades in silk underwear, particularly nightgowns and chemises, continues strong. Coral, tea rose and other of the deeper pink shades are very good at present, displacing to some extent such out shades as nile green. The season has opened with such a heavy demand on those lines that manufacturers take three weeks for delivery and when the pressure of holiday buying makes itself felt, as it soon will, the indications are that delivery dates will be set still further ahead.

* * *

The Wuerdeman Textile Mills, Fort Plain, N. Y., report that their line of "Ming Toy" glove silk under garments recently offered to the trade have met with good demand, with orders being booked sufficient to insure steady operations for some time. C. B. Snell, sales manager, has returned from a business trip to Ohio, which he stated was very satisfactory.

* * *

The Ford Mfg. Co., Waterford, N. Y., has increased operations by taking on 25 additional workers. The company has orders on hand sufficient to guarantee capacity operations until Jan. 1, 1926.

* * *

An involuntary petition in bankruptcy has been filed against the C. B. S. Knitting Co., Leesport, Pa., by a number of creditors. It is understood that a receiver will be appointed soon.

Favorable Outlook in Knit Outerwear

Balbriggans Still the Leader—Weather Has Been Against Staple Sweaters

Continued expansion of interest in the knitted outerwear market is reported from most sections of the trade and once more the balbriggan type of fabric and dress is the leader. It may seem tiresome to repeat discussion of a particular kind of fabric week after week but there is no gainsaying the fact that the impetus given to balbriggan has been the outstanding feature of the outerwear market recently. Reports from yarn houses indicate that improved demand is being experienced from firms manufacturing balbriggan fabrics.

Much of the recent weather has not been conducive to broadening of duplicate business on staple sweaters but the drop in the temperature on Tuesday imparted greater confidence even though naturally it did not result in immediate increase in orders. No letup is noted in the call for cricket sweaters with jacquard golf hose to match and it is apparent that this type of outerwear is in for a well sustained period of favor.

The bathing suit situation is unchanged from that reported last week.

United States Not Ordering as Much German Hosiery

WASHINGTON, D. C.—Orders from the United States for German hosiery from the Chemnitz mills are not as large as in previous years, reports Consul L. G. Dreyfus, at Dresden, to the Commerce Department. Domestic consumption of Chemnitz hosiery in Germany is practically double pre-war and the mills are booked for several months ahead despite decreased exports.

Reading Hosiery Mills Better Employed

READING, PA.—Current business reviews by the Chamber of Commerce indicate that a larger number of people are at work here this month than in August. Compared with the same month last year, the increase is 2,796. There are fewer workers in textile lines, except in braids and laces, which are gaining. Some of the bigger hosiery mills have more people at work.

Decreased Hosiery Production in July

A production of 4,564,163 dozen pairs of hosiery, all classes, in July is shown by the Department of Commerce in its monthly statistics, based on reports from 321 establishments, represent 405 mills. The 321 establishments included in this statement produced approximately 63% of the total value of hosiery reported at the Census of Manufactures, 1923.

For purposes of comparison, a summary of returns from 311 identical establishments for June and July is given. This shows that the total production of hosiery, all classes, in July by these 311 establishments was 4,498,402 dozen pairs as against 4,686,903 dozen pairs in June.

The following table gives additional comparative statistics for the two months, the figures representing dozen pairs:

Orders and Stocks	*July*	*June*
Shipments during month	4,563,288	4,857,645
Finished product on hand, end of month	7,943,809	7,988,626
Orders booked during month	3,974,132	4,931,027
Cancellations received during month	171,827	306,913
Unfilled orders on hand, end of month	8,878,052	9,542,887

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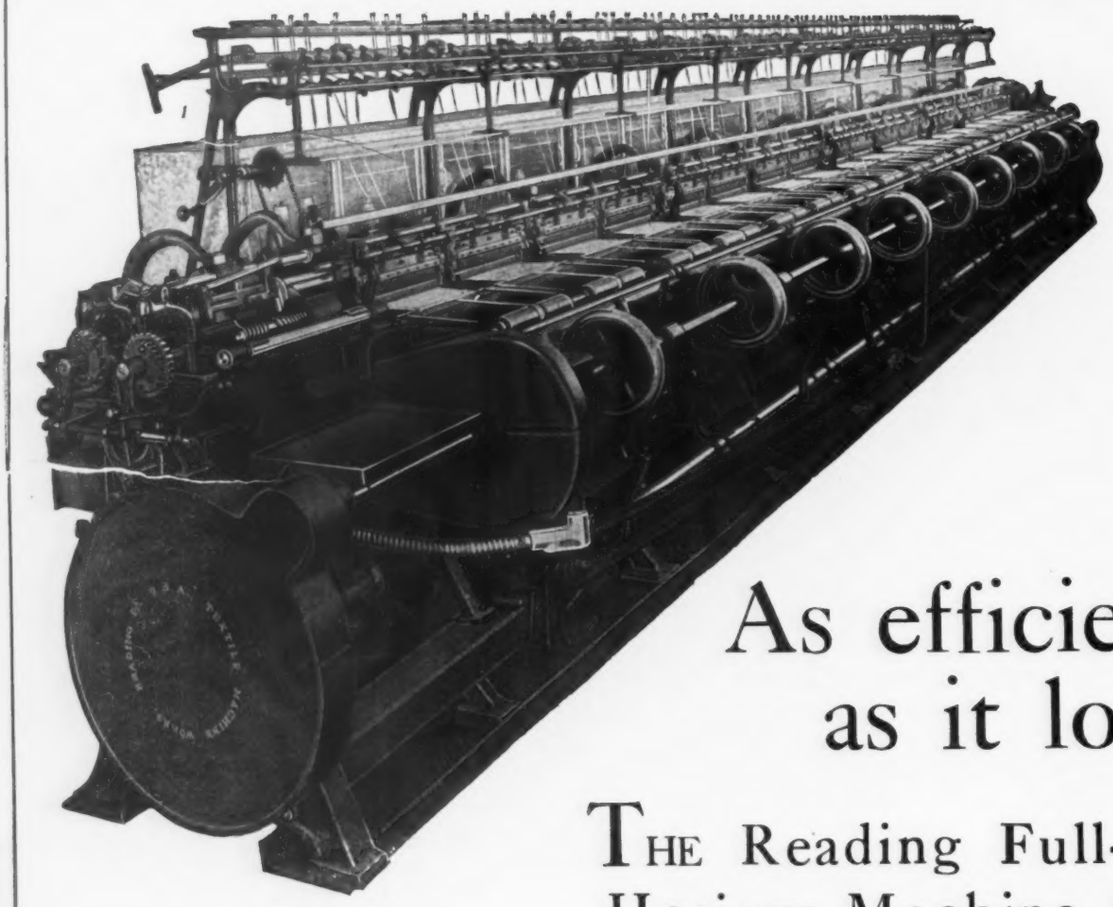

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SILK GOODS MARKETS

Price Advances Are Likely in Broadsilks

Manufacturers Have No Alternative as Raw Silk Rises—Stocks Light

The topic of chief interest in the broadsilk market last week was the all absorbing question of a general advance in prices. One would think that a silk manufacturer would accept it as the natural thing that when raw silk advances enough to make a material difference in his cost of production, he would raise his own prices to offset the extra cost. It is even possible to imagine him going about it with an emotion akin to pleasure, knowing, as he does, that the goods he has in stock and process of manufacture will net him so much extra profit. So well have buyers impressed their slogan of lower prices on his subconscious mind that the very thought of raising prices sends a cold thrill of horror down his spine. Instead of realizing that every firm is faced with the same problem and finds it just as necessary to get more out of their merchandise as he does, he leaps at the conclusion that everyone else will continue to sell at the old prices and that this sales will fall flat.

In spite of their fears, however, it would seem that silk houses will shortly have to inaugurate a general advance and the sooner they get it over with the better. Raw silk since the latter part of the spring has advanced from 60c to $4 a pound, depending upon the grade and kind. Many firms are still struggling to sell at little or no advance over quotations that prevailed at that time. Through July and August they were buoyed up to a certain extent by the hope that the market would decline late in August, which would permit them to buy to better advantage, and average up on some of their higher priced raw silk. Instead of anything like this happening the market astounded them by advancing rather sharply. Starting on Aug. 20, or thereabouts there was a steady rise which carried through Labor Day and brought quotations to $7 a pound for Crack XX 13/15 silk. A number of silk houses have already advanced prices 2½c to 5c a yard, others have notified their customers that prices will be advanced on some set date, usually two weeks to a month later, prices will be revised, while others are still thinking of it. The latter seem to be in the majority.

There is no particular reason why there should be any tremendous difficulty in getting more out of the merchandise. The broadsilk market is moving along at a satisfactory pace. Converters and jobbers have shown confidence in the continued popularity of silks by placing greige goods business up to and in many cases beyond the end of the year. Cutters have only small stocks of finished silks and are in the market right along. Retail buyers likewise will have to buy as soon as some good, snappy weather comes along and starts the customers' minds to thinking of fall dresses.

SILK SITUATION AT A GLANCE

PRODUCTION:	Good.
DEMAND:	Holds at Peak.
STOCKS:	Moderate.
RAW SILK:	Prices steady; stock unchanged.
SENTIMENT:	Mills consider price advances.

ACTIVE SILK STOCKS ON NEW YORK STOCK EXCHANGE
(Week ending Sept. 15th)

High 1925	Low 1925	Stock	Sales	High	Low	Last
40⅝	37	Belding Bros.	78,700	40⅝	37⅝	39½
47½	30¾	Century Ribbon Mills	300	31	31	31
34½	18¾	Julius Kayser & Co.	3,100	34½	32¼	33
37½	22½	H. R. Mallinson & Co.	4,200	26⅝	25⅛	25⅝
24¾	15¼	Van Raalte & Co.	——	—	—	—

Raw Silk is Selling Ex-Speculation

Inventory Appreciation as Prices Rise not Looked for—No Speculation in Recent Rise

THE recent advance in raw silk that brought the market from a $6.50 level to close to $7.00 for the higher grades was very much of a surprise to a great many in the trade. It would seem moreover that a majority are now looking for a reaction that will bring prices down somewhat nearer the former level. The advance was about as unpopular as any advance could be, for far from receiving it with approving smiles the silk manufacturer in most cases seems to have been caught unprepared. Raw silk appears today to an unbiased observer to be in that strong position of selling "ex-speculation." The best proof of that is the present attitude of about 90% of those who would normally benefit largely by any advance in quotations viz. broadsilk and hosiery manufacturers, the cutting up trade, and to a less extent the retail stores.

All along the line one finds the same situation. Raw silk importers do not appear to be unduly elated and it is believed that several are actually short of the market having accepted contracts for deliveries this fall that they have carelessly neglected to cover. Broadsilk manufacturers have given no cheers despite the fact that they will benefit by the appreciation of the merchandise inventory. Some mills have covered for a month or so and a still smaller number somewhat further ahead but the vast majority will have to buy at no distant date. With their spring openings soon to be announced they hesitate to advance prices on spring numbers but at the same time they would hesitate still more to maintain prices at unchanged levels and then see the raw market go up to $7.50 or thereabouts.

If information emanating from the garment industry is correct dress and cloak houses have very small stocks of finished silks on hand having carried their policy of cutting conservatively over into their buying of piece goods likewise. It is reported that some firms are scouting around looking for cheap lots from other cutting up houses only to find that quantities available are almost negligible. And to round out the circle we have the retailer whose position today is notoriously a matter of small stocks and quick turnover.

All of the above would point to the conclusion that the late advance is the result of a strong position in the raw silk market and not to any semblance of speculation. Buyers of every description are bearish and state that the market must come down which is generally the time that it does not. Raw silk is selling "ex-speculation."

SUMMARY OF SILK CABLES

Best No. 1/X Yokohama.....2080 Yen
Exchange at 3 m/s.....41¼
Cost C. I. F. New York.....$6.79
Stocks Yokohama Sept. 10th.....25,600 bales

The Yokohama market gave evidence of a steady undertone last week. Prices there eased off slightly but not enough to indicate that the rise of the previous two weeks had been too rapid or extensive. Early in the week the export market was very dull which resulted in a 20 Yen concession by holders on the 14th. Exchange moved off at the same time which brought in more buying on the 14th, 15th and 16th. Transactions for the week however, were rather light amounting all told to less than 4,000 bales. Cables from Milan reported steady markets there with the laid down cost of Italian silks further increased by the advance in Lire exchange. Shipments of Canton silks are being made from Shanghai but not in quantities sufficiently large to make an impression here.

Raw Silk Easier

Market Quiet as Manufacturers Hold Off

The raw markets were rather quiet last week, manufacturers evidencing no particular rush to buy at today's levels. The somewhat lower prices that importers made on Saturday the 12th and on Monday brought in a fair response. On these days and subsequently, however, sellers had to quote very close to actual costs to get any business at all. Many buyers were waiting until after the holidays hoping that continued small sales in Yokohama would cause the market there to go off still further. The discount on the 20/22 size became still greater last week, white silk being offered up to 20c a pound under 13/15's and yellow silk as much as 25c below. Most of the business placed appeared to be in the coarse sizes. Canton silk was being offered in small quantities around $6.30 October delivery in New York without finding many takers. Prices are as follows:

(90 days basis)

Japan Filature, Grand Double Extra. 13/15	$7 15
Japan Filature, Crack Double Extra. 13/15	6 95
Japan Filature, Double Extra..... 13/15	6 90
Japan Filature, Best X..... 13/15	6 85
Japan Filature, X..... 13/15	6 82½
Japan Filature, Best No. 1/X..... 13/15	6 80
Canton Filature, New Style..... 14/16	6 40
Canton Filature, New Style..... 20/22	5 50
Italian Grand Extra Classical.....	8 40
Tsatlee Rereel, "Blue Dragon and Flying Horse"	5 25
Tussah Filature, eight cocoon.....	3 34

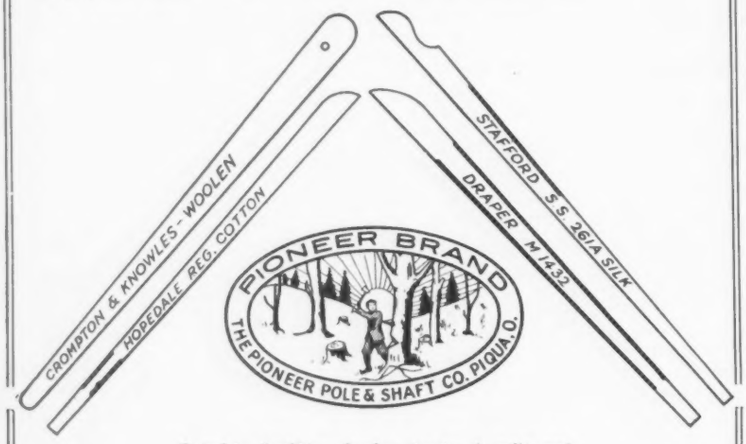
MELBOURNE, AUSTRALIA. The Lincoln Knitting Mills, of Melbourne, producing hosiery and underwear, were partially destroyed by fire recently. They have ordered new machinery to replace that destroyed.

PICKER STICK WISDOM

No textile equipment made of wood receives harder knocks and rougher treatment than the Picker Stick. Every minute of the working day it is busy, stopping and throwing the shuttle.

Manufacturers with an eye to economy realize this—and specify Pioneer Brand Picker Sticks made of Hickory by a reliable, experienced firm that controls its production from raw material to finished article.

Ask for a sample of Pioneer Brand Picker Sticks before ordering your next supply. Estimates gladly furnished.


CROMPTON & KNOWLES - WOOLEN
HOPEDALE REG. COTTON
PIONEER BRAND
THE PIONEER POLE & SHAFT CO. PIQUA, O.
DRAPER M 1432
STAFFORD S S 261/A SILK

Complete facilities—lumber tracts, 6 mills and Manufacturing Plant.

The Pioneer Pole & Shaft Co., Memphis, Tenn.

Manufacturers of

HIGH GRADE PICKER STICKS

BLEACHED GOODS

versus

AUTOMOBILE TIRES

You buy tires
for their mileage.
Why not buy bleached
goods for their wear?
The Solozone-white
goes further
and remains white,
soft and elastic.

The Roessler & Hasslacher Chemical Co.

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Four reasons why you should

Standardize on Shambow Shuttles

1. SUPERIOR QUALITY
2. PROMPT DELIVERY
3. INTELLIGENT SERVICE
4. ATTRACTIVE PRICES

After you have given Shambow Shuttles a thorough test you will never change to another make of shuttle.

You can make the test at our expense—ask us how!

SHAMBOW SHUTTLE CO., *Woonsocket, R. I.*

Warehouses and Salesrooms at

GREENVILLE, S. C.; PATERSON, N. J.

SCOTT TESTERS

The United States Standard Apparatus for tests of all Fabrics, Yarns, Twines, etc.

Used by every U. S. Government Department and standard equipment with practically every foreign government.

For both routine and experimental purposes they meet the requirements of the textile and rubber industry all over the world. Proven by years of continuous service to be Accurate, Simple and Easy to operate and Reliable under all Conditions.

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PROVIDENCE, R. I.

COTTON GOODS MARKETS

Cotton Goods Show Increasing Activity

Upward Movement of Cotton is Dominating Influence—Print Cloths Lead in Demand

The cotton goods market has waked up. It seems almost like the good old days of active buying and even alloting goods although the latter condition is not very evident as yet. The principal reason for activity with the majority of buyers is the fact that they are unable to get deliveries when they want them. This is such an unusual condition that they hardly know what to make of it and as a consequence are becoming somewhat perturbed over the situation and the outlook. This has resulted in a volume of business on some lines, such as print cloths, that exceeds anything that has been done for a year or more. What is more there are evidences that the active demand will spread into other lines which have not as yet shown any material change either in price or request.

Cotton Dominating Influence

Beginning with the crop report, the cotton situation has been an increasingly bullish influence on the piece goods market. With the extension of the drought which may or may not be broken and the possible deterioration, if it is broken, as the result of severe rain storms, there is every basis for the advances which have taken place this week and which many believe will be the forerunner of still further increases. Whether or not this prophecy is fulfilled, mills for the most part are short of cotton and in their endeavors to buy find it very difficult to get the requisite staple and quality. Reports are to the effect that the cotton which is coming in is very much mixed and of poor quality. Prices on anything above an inch in staple are unusually high and it is not surprising therefore that manufacturers as a rule are unwilling to accept propositions even at the market and are asking insistently for higher prices to compensate them for the increased cost of raw material.

Question of Profits

It is natural to query whether at existing prices for cotton it is possible for mills to make a profit at the new level of quotations that has been established. It is impossible to answer this question unequivocally for it all depends upon other factors of overhead, etc., which enter into the situation. It is the consensus of belief, however, that with low cost mills, turning out a volume of merchandise, it is possible to secure a small margin of profit on goods which have been advanced. Even smaller mills, where the overhead is not excessive, it is thought can produce goods today on a basis which does not mean the mere exchanging of dollars. No one will admit that the margin is excessive or even satisfactory but conditions are not such as have obtained many times within the last year or two, when the more goods sold the greater the loss.

Print Cloths the Leader

The print cloth situation is the dominating factor in the market, both from the point of sales and the price advance. Quotations have gone up ½c. to 1 c. a yard in many instances and the volume of business done within the last week or two has more than met the expectations of sellers. Converters are becoming very much worried about certain constructions, on which they have been in the habit of ordering for immediate delivery and getting without difficulty. Calm judges of the situation feel that while no distressing scarcity of these or any other lines is likely to be witnessed, yet they look for the necessity of substitution in instances and more or less delay in deliveries. The buyer has only himself to blame for this situation and possible contingency as he could not be persuaded of anything different from that which has obtained for so many months.

Other Lines Affected

While the big volume of sales has been on goods of print cloth yarn construction, sellers see indications of demand spreading to other lines. Sheetings and drills are beginning to improve from the demand standpoint and even denims, which have so long been in a slump, are being inquired for in a more satisfactory manner. The outing flannel market while seasonally quiet is expected to show decided activity with a few days of cool weather. The situation statistically considered is very healthy on this line as stocks are at a very low ebb. It is expected that buyers will come in with a rush for a decided volume of merchandise once they begin to realize the situation in other lines and the likelihood of the same conditions applying to outings. Damasks have shown a material improvement and their increasing value as a barometer of the finished goods market is giving sellers decided encouragement as an augury for the future. New lines of rayon effects are being shown with reported success. There is a feeling in certain quarters that bizarre patterns and unusual styles may be overdone and may prove somewhat of a setback temporarily to this division of the market. Nevertheless it is admitted that the possibilities of rayon in combination with cotton are infinite and many believe the surface has not been scratched.

Comparative Quotations

	Sept. 16	Sept. 9	Sept. 17, 1924
Spot Cotton, New York	24.70¢	23.55¢	22.50¢
Print Cloths:			
27- in., 64x60, 7.60 yd	6¾¢	6½¢	6⅜¢
38½-in., 64x60, 5.35 yd	9⅝-9¾¢	9⅜-9½¢	8¼-8⅜¢
39- in., 68x72, 4.75 yd	10¾¢	10¼-10½¢	9¼¢
39- in., 72x76, 4.25 yd	12¢	11½¢	10⅞-11¢
39- in., 80x80, 4.00 yd	12¾¢	12¼-12⅜¢	12¢
Brown Sheetings:			
36- in., 56x60, 4 yd	10½-10⅝¢	10¼-10⅜¢	10¼-10½¢
36- in., 48x48, 3 yd	12½-12¾¢	12¼-12½¢	13¼¢
37- in., 48x48, 4 yd	10¢	9⅝-9¾¢	10¢
Pajama Checks:			
36½-in., 72x80, 4.70 yd	11⅛-11¼¢	10¾¢	10¼¢
36½-in., 64x60, 5.75 yd	9¢	8¾¢	8¼¢
Drills, 37-in., 3 yd	13¢	12¾¢	13¼-13½¢
Denims, 2.20s	19¢	19¢	*21-21½¢
Tickings, 8 oz	23½¢	23¢	*25-25½¢
Standard Prints	9½¢	9½¢	10¢
Eastern staple ginghams, 27-in	11½¢	11½¢	*12-12½¢

* Nominal.

MANCHESTER NEWS BY CABLE

Manchester, Eng., Sept. 16 (Special Cable to TEXTILE WORLD).—Numerous operators caught short by raw material advance. Considerable covering in yarn and cloth since a week ago. Short interest not yet entirely eliminated. Increased cloth turnover for India and China, especially in bleaching and printing styles. Offers in gray staples remain very poor. Freer demand for Egypt and more business. Encouraging turnover for Continent. More bids for South America. Home trade is more active. Index number for the week is 201.

Cotton Goods Notes

The Louisville (Ky.) Textile Co. announces the appointment of Howard P. Krentzer, 71 Worth St., New York City as sole selling agent. Mr. Kentzer has been for eleven years with the Westerly Textile Co., but hereafter will devote his entire attention to the sale of this account. The Louisville Mills make a wide line of dobby goods, including draperies, rayon effects, etc.

* * *

The Riverside & Dan River Cotton Mills announce that their various lines of ginghams for spring 1926 are now ready for the trade. These are mainly, Pride of America, 32-inch dress ginghams, Dan River 27-inch dress ginghams and Navarre 26-inch dress ginghams. Prices are all the same as those of last season, and the delivery is from November to March, inclusive. The company is also naming prices on Fantasy 32-inch rayon crepes.

* * *

Smith, Hogg & Co. have made prices as follows:

Red Seal Zephyrs, 32 in., 21c; Red Seal Zephyrs, 27 in., 17c; York Seersucker, 32 in., 21c; York Dress Gingham, 27 in., 15c; Berwick Chambray, 32 in., 17½c; Yomac Gingham, 32 in., 19½c; Hipo Fine Cloth, 32 in., 22½c; Telfo Gingham, 36 in., 25c; Kroy Krinkle, 26 in., 19½c; York Golden Cloth, 32 in., 22½c; Criterion Chambray, 30 in., 21½c; Elanette, 32 in., 27½c.

York No. 10 Flannel, 32 in., 35c; Eden Flannel, 32 in., 27½c; Lenroy Suiting, 32 in., 23½c; Laineux Suiting, 32 in., 27½c; Holanda York, 28 in., 27½c; Everett Classics, 26 in., 14c; Everett Classics, 32 in., 17½c; Everett S C Shirting, 28 in., 17½c; Everett S C Shirting, 32 in., 20c; Tiger Chambray, 28 in., 15c; Silver Key Chambray, 32 in., 17½c; Santeen, 32 in., 22½c; Everplay, 32 in., 22½c.

Aldry, Broadcloth Madras, 32 in., 27½c; Lavar Suiting, 32 in., 18½c; Naomi Cheviot, 28 in., 21c; Peggy Cloth, 32 in., 18½c; Peggy Cloth, 36 in., 21c; Bluebell Cheviot, 28 in., 17½c; Bluebell Cheviot, 32 in., 20c; White Pine Cheviot, 32 in., 17½c; Lowmass Cheviot, 28 in., 15½c.

Eastworth Seersucker, 26½ in., 17½c; Biddeford Pool Suiting, 32 in., 35c; Dril Valuta, 27 in., 18½c; Gourateen, 36 in., 42½c; Mass. Sunfast Drapery, 32 in., 87½c; Sagamore Cheviot, 36 in., 17½c; Bengal Cheviot, 36 in., 22c; Two Oxen Cheviot, 32 in., 23c; Wymoor Flannel—part wool, 36 in., 75c.

F. O. B. Mill, no freight allowance. Delivery—October to March. Prices subject to change without notice.

Light Yellow and Dark Green

Are only two of the seventeen colors in which the famous Empire Textile Mill Crayons can be supplied. See that your superintendent receives one of these color cards showing exact shades. "Empire" Textile Mill Crayons are packed in a strong lock-cornered wood box. Each contains one-half gross of sticks. The sticks measure 1" x 4."

Let us know your requirements. Write right now for prices. Do not fail to ask for your color card. It has been carefully set aside for you waiting to be mailed upon request.

THE AMERICAN CRAYON COMPANY
SANDUSKY · OHIO NEW YORK

The

PEERLESS HOSIERY DYEING COMPANY
Pleasantville, N. J.

Five miles from Atlantic City
Formerly located in Philadelphia

Dyers
Bleachers
Finishers
SILK
ARTIFICIAL SILK
WOOL and
WOOL MIXTURES
MERCERIZED
HOSIERY

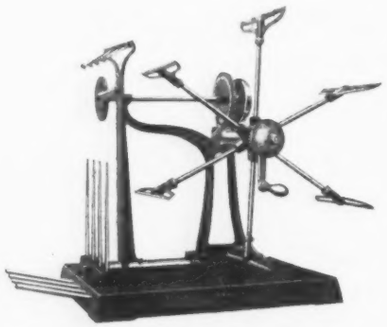
TWO COLOR SPECIALISTS

Pioneer Redyers of Hosiery

No connection with any other firm

HARRY E. BREWIN, PRES. CAPACITY 5,000 LBS. DAILY

YARN AND ROVING REELS AND SCALES



It is to your advantage to Test Yarn Accurately!

For simplicity and dependable accuracy in testing and computing the stretch, strength and number of yarn, the Brown & Sharpe Yarn Reel, No. 975 is indispensable in the Sample Room.

Send for "Tables and Directions for use with Yarn Reels and Scales," a useful booklet for the Sample Room. Write for a copy to-day.

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PROVIDENCE, R. I., U. S. A.

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Discounts and Guarantee Sales
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Established over 85 Years

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Wire Heddles Mill Supplies
FALSE REED WIRES
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WOOL GOODS MARKETS

Threat of Stoppage in Garment Trade

Impediment Will Blow Over, Merchants Believe — Rayon Decorations Hold Interest

The women's wear market is watching with vital interest the progress of the cloak and suit situation in New York City. There has been a threatened stoppage of work by the sub-manufacturers as the outcome of a controversy with the jobbers. At mid-week the stoppage order had been held up, but there was no evidence that the contractors and the jobbers were any nearer getting together. The situation is one which will in all probability blow over, merchants believe, after the Jewish holidays. The concerns affected would be closed down during the period of these holidays anyhow, and after that time the business interests of each are such as to make agreement between them much more profitable than disagreement. The immediate effect of the upset was reported to be a lessening of deliveries from selling agents to the garment houses' spongers and examiners. It seems a desirable thing to prevent any accumulation of merchandise, but as the trade is just on the verge of improvement, it is believed that orders to hurry deliveries will be forthcoming at the end of the month when the Jewish holidays are over.

The success of rayon decorated worsteds continues to be the feature of the women's wear market. Several of the large worsted mills which have found it a great problem to find anything on which their large bulk production of piece dyes could be turned in an era of fancies, have found in rayon decorations the avenue of admission within the gates of the fancy goods manufacturers. It is the hope of many sellers that these goods will increase in importance as the months go by and give a new period of real activity to the women's wear market.

New openings of women's wear fabrics for the spring season show further extensions of the use of rayon and they are being favorably commented upon by buyers.

Women's Wear Notes

Frederick T. Lawrence & Co. have opened a number of women's wear fabric ranges for spring.

* * *

Buyers of popular priced lines are enthusiastic over the merchandise which has been shown them in the offices of the large corporations.

* * *

Attractive models which are quite different from what has been pushed in recent seasons, can be made up for a comparatively low price.

* * *

On the more expensive and exclusive lines, it is noted that the best minds recommend a return to soft and conservative color effects.

Botany's New Spring Line

(*Continued from page 38*)

er dress and one piece sports dress; Marion Stehlik, Jumper dress; Norman & Norman, Jumper dress; Madame Routon, Tailored dresses; Rembrandt Guild, Child's dress.

The New Colors

The new shades stressed by Botany are: Linden Yellow, Alpine Blue, Parrokeet Green, Silver Mauve, Quaker Gray, Wallflower, Zinnia, Melon and Rosaire—a new rose beige. A novel range of sixteen specially selected shades is stressed as the "Dusty Pastels."

Following is the complete color offering.

GREENS — (new) Parrokeet, Laurel, Printemps, Spearmint; (repeats) Creme de Menthe, Almond, Fairway.

BLUES — (new) Danube, Glacier, Cobalt, Bellflower; (repeats) Sky, Azure, French, Flemish, Navigator, Whirlpool.

YELLOWS — (new) Narcissus, Linden, Maize; (repeat) Sulphur.

TANGERINE SHADES — (new) Wallflower, Melon, Gypsy, Marigold, Zinnia.

BOIS de ROSE — (new) Rosaire, Korea, Rose, Ash, Rosewood; (repeat) Monterey.

MAUVE — (new) Silver Mauve, Old Mauve; (repeat) Orchid.

GREYS — (new) Pewter, Quaker, Corbeau; (repeat) Cement, Rock, Hearthstone, Greystone.

TANS — (new) Polo, Sawdust; (repeats) Calabash, Cork.

BROWNS — (new) Cameo, Bark, Old Cedar, Acorn; (repeats) Firestone, Oakcrest, Cheroot, Muskrat.

Fabric Price List

The list of Botany spring fabrics with weights and prices follows, all being 54 inches wide:

	Style	Price	Oz.
Moleen	6363	3 37½	8½
Krismet	6364	4 35	12
Ottonia	6365	3 65	9
Sheencova	6366	2 85	7
Shelbourne	6367	3 50	8
Blocksheen	6368	2 75	7
Bottinade	6369	3 25	9½
Cordevere	6370	2 75	7
Manilon	6371	No pr.	11½
Metal-Tone	6372	3 50	9½
Silvana	6373	2 25	6½
Elektra	6374	3 12½	9
Novello	6375	2 57½	8
Crestone	6376	3 12½	9
Chevosheen	6377	2 50	8½
Rayotwill	6378	2 25	7
Glennaire	6379	2 87½	9½
Covablok	6380	3 00	9
Repeau	6381	3 85	11
Scotney	6382	3 25	10
Blocksheen	6383	2 75	7
Baskeen	6384	2 25	5½
Botonala	6385	3 75	13
Covertwill	6386	3 50	11
Covina	6387	3 37½	10
Travessa	6388	2 67½	7½
Style	6389	2 70	9
Chiffon Cloth	422	2 50	9

Men's Wear Finds Interest in Cheviots

Market Otherwise in Momentary Lull—Need Cold Weather for Fall Trade

Against the general inactivity of the last ten days in the men's wear market, the interest shown by buyers in cheviots stands in sharp contrast. It is said on the market that the principal use for these fabrics at present is in double-breasted suits for fall. There is also the fact that the cheviot is a favored fabric for overcoats, but this does not seem closely related to the current call for them. Conservative mill agents believe that the distribution of double-breasted suits will be limited and that recent business in cheviots seems large only because inquiry has been general, and it has proved sufficient to clean out what small accumulations existed in the hands of sellers. Cheviots had a strong following at the time of the opening of fall, 1925, lines, but since then interest has been dormant until recently. The fact seems to be that these are the first of the fall fabrics to awaken. Mill agents are taking the movement of cheviots as a foreshadower of a broader interest in the fabric market by clothiers. Agents repeat their belief that clothiers as a class are not well covered for fall, and that a considerable duplicate demand must come to light during the next few weeks if a normal business in clothing is to be done.

The warm weather which was current in all parts of the East at the close of last week and which continued with only a slight lessening into this week, is not the kind of weather to start off the fall clothing season at retail with anything of a boom. The cooler, more stimulating weather which is almost sure to be experienced before the month is over, may do a great deal to start the distribution of fall garments on a large scale. Such a push from the consumers' side of the market will do more to bring business than the best sort of sales talk by mill agent to buyer.

The business already on the books for the spring, 1926, season is undoubtedly the best initial business seen in the market for several seasons. Merchants with a broad viewpoint regard the start as near a normal start as anything which they have witnessed since before the war. The post-war seasons, which started with allotments of goods, were of course just as abnormal on one extreme as were the more recent seasons, when buyers scarcely ordered even sample pieces. There is still doubt in the minds of some sellers as to the stability of some of the business which they have taken, but this feeling springs from a sense of caution and perhaps some innate pessimism. Even those merchants who expect the market to move gradually downward during the next few years, are not using that as a basis for pessimism. However a little further price revision for next spring does still remain to be done according to some authorities, though this applies chiefly to fabrics which are out of line with the majority.

Men's Wear Notes

Louis A. Hird, of Samuel Hird & Sons, Inc., Passaic, N. J., sailed for Europe last Saturday on the S. S. Majestic. He was accompanied by Mrs. Hird and will be abroad about three months.

* * *

The Hockanum Association has opened for spring a complete line of white worsted striped trouserings at $3.12½ regular. The stripings are in black and other shades, both pencil and fancy effects in single and multiple patterns.

* * *

Howard L. Curry Co., Inc., has opened Dawson twill cassimeres, 56-in., 12½-13 oz., at 95c.

* * *

The improved movement of worsteds for the spring season is still a matter for comment in the market. As times goes on it is becoming less and less likely that there will be much change in the volume of business as a result of style switching.

* * *

The extravagant use of reference samples is a matter of expense to sellers which they would like to devise some means to avoid. The number issued this season is wholly out of proportion to the volume of business in any one style.

* * *

The trend toward the more conservative shades is noted in retail circles. Sellers believe that this will be limited to certain quarters and particularly limited to the fall season. With the advent of next spring it is expected that young man's fancy will turn to the brightest and the lightest shades again.

BRADFORD NEWS BY CABLE

Bradford, Eng., Sept. 16 (Special Cable to TEXTILE WORLD).—Manufacturers continue to obtain satisfactory turnover, though orders are for small quantities for quick delivery. Export trade is also improving, but new Australian tariff will substantially reduce shipments of low priced woolens to that market. Exports to the United States in August were 771,000 square yards of woolen tissues and 363,000 of worsted tissues.

No. 4 Hand Power Railway Sewing Machine

No. 4 Hand Power Railway Sewing Machine

This machine is especially adapted for use in the finishing of cloth in textile mills, bleacheries and dye houses where straight seams are necessary.

This machine will sew wet or dry, thick or thin goods and is built in various lengths for any width of cloth and can be moved about the factory from place to place.

The seam is sewed very near the edge and can easily be removed, leaving the edges all even. Write for our latest catalogue.

Tillinghast Supply & Machine Co.

76 Lafayette St. Salem, Mass.

LEAKS

Does your roof leak? Will it stand up this winter? Defective roofs cause many thousands of dollars loss each year.

The application of a good roof paint may put it in first-class condition, and the best roof paint you could possibly secure is **VALDURA ASPHALT PAINT,** especially made for this purpose.

VALDURA will not run in hot weather, nor will it crack or peel in extreme cold weather. Its covering capacity is large; it is easy and clean to apply; contains no coal tar or oil asphalt, and will far outlast all other roof paints.

A trial will more than convince you of the honest merits of this paint.

AMERICAN ASPHALT PAINT CO.

844 Rush Street Chicago

RALPH E. LOPER & COMPANY

Specialists in Textile Cost Service

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Send for free booklet, "Practical Simplicity in Textile Cost Methods"

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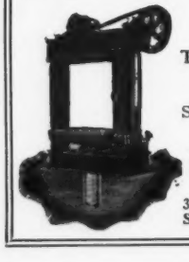

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Special Attention to Textile Invention

FINANCIAL MARKETS

Foresee Better Earnings

Mill Stocks Advance on Improvement in Market

NEW BEDFORD, MASS.—The following statement on the financial outlook is by Sanford & Kelley: "Throughout the month of August there was a steady improvement in underlying conditions affecting all lines of the textile industry. Orders increased in the fine goods section to a considerable extent and there was good demand for fine cotton and silk mixtures, and New Bedford mills took orders that will keep them busy for a considerable length of time. Not so much business developed in the print cloth mills, but the prices and situation greatly improved. Last year in the summer months, Fall River manufacturers could not come within 5c a pound of making the cloths for the market price and come out even. Curtailment in expenses and lower prices for cotton have made up this difference and now some of the better print cloth mills can manufacture at a profit. What is more gratifying is that the outlook for the future indicates further improvement so that many of the mills which have been idle for a long time, may be able to start up manufacturing at a profit. In making this statement, however, we of course refer to those that have good management.

Mill Stocks Rise

"With the yarn mills during August, there was a gradual improvement in the fundamental conditions but this did not develop until last week into real business. Recently, however, some of the larger yarn mills have taken substantial orders, more in fact than for a considerable length of time, and sentiment is much better even in the case of cotton yarns which, for a long period, have been the worst spot in the textile industry. The improvement in the volume of business and the margin of profit has not been reflected in higher prices for the shares of the mills to any such extent as conditions warrant. However, there have been some pretty good advances. Sharp Mill common and preferred have advanced about $7 a share and Nonquitt more than $10. Taber is up $15 a share from its low figures of the year and is much in demand. There has been a considerable volume of Wamsutta Mills change hands at constantly rising prices, the advance amounting to $10 or more a share in the aggregate. In some of the higher priced mill stocks, such as Bristol, Neild, Soule and Quissett, offerings have been withdrawn to such an extent that it is almost impossible to secure them even at an advance of from $20 to $30 a share over the low figures of the year.

"In the Fall River market, the advances have not been so numerous, but they have been substantial in several of the better class stocks, such as King Philip, Flint, Sagamore and Pilgrim. In the case of most of the issues where the management is reasonably good, it is constantly more difficult to secure the shares in volume even at slight rises in prices over previous sales. There is a much better feeling, also, with respect to the future outlook for the Fall River mills. This arises primarily from the fact that some of the former leaders there in the textile industry who insisted on playing politics and sticking to old fashioned methods have been pretty thoroughly discredited by their failure to accomplish results.

"The continued rumors of an extra dividend before the end of the year on King Philip, have led to a substantial rise in the price of this stock and it is now quoted as high as 153 and 154 bid for small lots. It is generally felt on the street that a substantial extra payment is likely in the fall on this stock which has for several years been one of the best earners in Fall River.

"Sagamore has had an advance of over $30 a share although the amount of stock that has changed hands has been rather small. Stevens is another exceptionally good earner. This stock ought to work considerably higher this year.

"The retirement by payment at par of one-third of its capital of the Union Cotton Mills has led to a better market for this stock with an advance from its low point of $10 to $15 a share."

Financial Notes

FALL RIVER, MASS.—The Flint mills has declared a quarterly dividend of 1% payable on Oct. 1 to stockholders of record Sept. 14. The rate is the same as for the previous quarter. The Tecumseh mills has declared a liquidation dividend of 3%, thereby making the total liquidation dividend to date from the assets not included in the sale of the plant to the Davol mills, 113%. * * *

NORTHBRIDGE, MASS.—The Whitin Machine Works, Whitinsville, are the largest taxpayers in the town of Northbridge, their assessment this year being $124,924.02. Other large taxpayers are the Paul Whitin Mfg. Co., $39,940.62; Whitin Bros., Inc., $11,162.13; Whitinsville Spinning Ring Co., $3,213.75; Whitinsville Cotton Mills, $158.10 and the Fibre Development Co., $150.

* * *

MONTREAL, QUE., CANADA.—Jas. R. Ritchie, secretary-treasurer of the Wabasso Cotton Co., Ltd., states that a dividend of $1 per share will be paid on Oct. 2, 1925.

* * *

MONTREAL, QUE., CANADA.—The financial statement of the Wabasso Cotton Co., Ltd., for the year ending June 30, went forward to the shareholders recently and showed an improvement, both as regards earnings and the liquid position, as compared with the preceding 12 months' period. The operating profits are up over $20,000 and total $285,749.

* * *

MONTREAL, QUE., CANADA.—For the third year in succession, Canadian Woolens, Ltd., deductions from operating profits and other income exactly balance, so that the profit and loss account for the year showed neither surplus or deficit.

* * *

FALL RIVER, MASS.—A special meeting of stockholders of the Flint Mills has been called for Sept. 28 to take action on the recommendations of the directors to reduce the capital stock of the corporation from $1,740,000 to $1,160,000 by retiring 5,800 shares of the capital stock by the payment of $100 per share from the quick assets. In its annual statement of Nov. 3, 1924, the corporation showed assets of $1,300,000 and no indebtedness. The capital was increased from $1,160,000 of its present amount by a 50% stock dividend in 1923. No recent sales of the stock have been quoted but the bid price has dropped to $97. The dividend rate for the present year is 5% as against 8% for 1924.

Boston Stock Auctions

The following sales of textile shares were made at Wednesday's auctions:

Shrs	Mill	Par	Price	Chge
11	Hill	100	221½	+ 5⅜
10	Pepperell	100	136	— 2
10	Brookside	100	106	— 9⅜
10	Newmarket	100	133½	+16½
15	Farr Alpaca	100	183-182½	— 4
27	Waltham Bleach&Dye	100	40	+ 5
10	Naumkeag ex-div.	100	192½	+ ½
10	West Point ex-div.	100	135¼-135	+ 1½
50	Plymouth Cordage	100	127½	+ ½
10	Algonquin	100	264½	
20	Great Falls	100	18@177⅛	— ⅛
15	Nashua	100	70¼	+ 4¼
10	Nashua pfd.	100	98	— ½
33	Nashawena 1st ins pd	100	108¾	+ 6⅜
2	Arlington	100	96	— 2½
6	Nat. Fabric & Fin'g.	100	65	— 42

249 Total.

Dividends Declared

Mill	Pd	Stk	Rate	Payable	To stk of
Canadian Conn.	Q	S% pfd	$1.50	Oct. 1	Sept. 18
Neumkeag	Q	com	3%	Oct. 1	Sept. 17
Am. Woolen	Q	pfd	$1.75	Oct. 15	Sept. 15
West Point	Q	com	$2.00	Oct. 1	Sept. 15

Expect Lull to be Brief

SPARTANBURG, S. C.—It is felt that the lull in the market for southern cotton mill stocks will not continue much longer, according to A. M. Law & Co. There are various signs pointing toward increased activity in the near future. The cloth market has become more active with broader distribution of goods in practically all classes. A strong cotton market has developed which has all the earmarks of maintaining present prices of cotton, if not higher figures. Curtailment has generally brought about a healthy condition of the industry. At present prices of the entire list are practically unchanged. Buyers, however, are beginning to look around for the higher grade investment stocks, and offerings are few at current prices.

New England Textile Stocks

(Quotations based upon last sales at Boston public auction and Boston Stock Exchange.)

	Latest Sales	Prev. Sales
American Woolen, pfd.	87¾	89
Amoskeag, com.	76	75¼
Androscoggin	125	132
Appleton	720	760
Arlington	96	96⅛
Bates	225	225½
Bigelow-Hartford, pfd	104⅛	106
Bates	225	225½
Booth	135½	.....
Edwards	115	110
Esmond, pfd	100⅛	93½
Everett	57	57
Farr Alpaca	182½	186½
Great Falls	17⅛	18
Hamilton Woolen	86	95½
Hamilton Mfg.	18½	34
Hill	17⅛	42
N. E. Southern, pfd.	35	33
Ipswich, com.	25	26½
Lawrence	45¾	50⅛
Ludlow Associates	166	166¼
Lyman	124¾	122
Massachusetts	96⅝	90½
Merrimack	98¼	98
Nashua Mfg. Co., com.	70¼	66
Naumkeag	192½	195
Newmarket	133½	117
Pacific	58	58½
Pepperell	136	137¼
Plymouth Cordage	127½	127
Tremont & Suffolk	43⅝	108⅞
York	77	78⅝

Fall River Mill Stocks

(Quotations furnished by G. M. Haffords & Co.)

	Bid	Asked
American Linen Co.	...	31
Arkwright Mills	...	15
Barnard Mfg. Co.	...	60
Border City Mfg. Co.	60	75
Borden Mfg. Co., Richard.	82	...
Bourne Mills Co.	...	103
Chace Mills	...	35
Charlton Mills	120	...
Cornell Mills	...	110
Davis Mills	87	...
Davol Mills	...	47
Flint Mills	97	...
Granite Mills	95	...
King Philip Mills	153	157
Laurel Lake Mills (com.)	5	15
Lincoln Mfg. Co.	77½	85
Luther Mfg. Co.	...	130
Mechanics Mills	40	50
Merchants Mfg. Co.	77	85
Narragansett Mills	...	90
Osborn Mills	...	80
Parker Mills, com.	...	15
Parker Mills (pfd.)	...	40
Pilgrim Mills (com.)	...	...
Pocasset Mfg. Co.	27	35
Sagamore Mfg. Co.	225	...
Seaconnet Mills	...	5
Shove Mills	...	45
Stafford Mills	30	...
Stevens Mfg. Co.	120	126
Union Cotton Mfg. Co.	105	...
Wampanoag Mills	...	50
Weetamoe Mills	...	...

New Bedford Quotations

(Quotations furnished by Sanford & Kelly)

	Bid	Asked
Acushnet Mills	84	...
Beacon Mfg. Co., com.	125	...
Beacon Mfg. Co., pfd.	...	101
Booth Mfg. Co., com.	117½	...
Booth Mfg. Co., pfd.	100	...
Bristol Mfg. Co.	175	...
Butler Mfg. Co.	119	...
City Mfg. Co.	110	...
Dartmouth Mfg. Co., com.	146	...
Dartmouth Mfg. Co., pfd.	85	...
Fairhaven Mills, pfd.	25	...
Fairhaven Mills, com.	...	25

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Financial Markets—Continued

Gosnold Mfg. Co., com.	65	...
Gosnold Mfg. Co., pfd.	72½	...
Grinnell Mfg. Co.	106	...
Hathaway Mfg. Co.	112½	117½
Holmes Mfg. Co., com.	...	105
Holmes Mfg. Co., pfd.	92½	...
Kilburn Mill	122	...
Manomet Mills	34	38
Nashawena Mills	110	112
Nelld Mills	215	...
N. B. Cotton Mills, com.	100	...
N. B. Cotton Mills, pfd.	97½	102½
Nonquitt Spinning Co.	56	59
Pemaquid Mills	...	26
Pierce Mills	400	450
Potomska Mills	88	94
Quissett Mills, com.	145	...
Quissett Mills, pfd.	100	...
Sharp Mfg. Co., com.	40	43
Sharp Mfg. Co., pfd.	62½	...
Soule Mills	180	200
Taber Mills	109	...
Wamsutta Mills	90	93
Whitman Mills	...	100

N. Carolina Textile Stocks

(Taken from list of Southern Mill Stocks quoted by R. S. Dickson & Co., Gastonia, N. C., and Greenville, S. C.)

	Bid	Asked
Acme Spinning Co.	96	101
Am. Yarn & Processing Co.	88	94
Arlington Cotton Mills	...	101
Arrow Mills	...	90
Cabarrus Cotton Mills	140	...
Cabarrus Cotton Mills 7% pfd.	109	...
Cannon Mfg. Co. (par $10)	15	...
Chadwick-Hoskins Co. (par $25)	14	16
Chadwick-Hoskins Co., 8% pfd.	102	...
China Grove Cotton Mills	108	113
Clara Mfg. Co.	...	88
Climax Spinning Co.	125	140
Clover Mills	79	...
Crescent Spinning Co.	93	97
Dixon Mills	94	101
Durham Hosiery, 7% pfd.	48	55
Durham Hosiery "B"	7	...
Eagle Yarn Mills	89	...
Eastern Mfg. Co.	63	71
Erwin Cotton Mills Co.	119	...
Erwin Cotton Mills Co., 6% pfd.	102	...
Gibson Mfg. Co.	125	...
Globe Yarn Mills (N. C.)	50	60
Gray Mfg. Co.	...	101
Hanes, P. H., Knitting Co.	8	9
Hanes, P. H., Ktg. Co. 7% pfd.	93½	97
Henrietta 7% pfd.	92	97
Imperial Yarn Mills	99	106
Jennings Cotton Mills	235	251
Linford Mills	95	100
Locke Cotton Mills Co.	...	151
Lola Mfg. Co.	69	85
Majestic Mfg. Co.	155	....
Mansfield Mills	135	141
Mooresville Cotton Mills	68	75
Myers Mill	...	71
National Yarn Mill	94	98
Parkdale Mills	80	90
Perfection Spinning Co.	90	98
Ranlo Mfg. Co.	114	...
Rhyne-Houser Mfg. Co.	84	95
Roanoke Mills, 7½% 1st pfd.	101	...
Roanoke Mills, 8% pfd.	99	...
Rosemary, 7½% pfd.	98	...
Rowan Cotton Mills Co.	93	97
Seminole Cotton Mills Co.	74	85
Sterling Spinning Co.	95	101
Stowe Spinning Co.	91	97
Victory Yarn Mills Co.	64	71
Winget Yarn Mills Co.	64	70
Wiscasset Mills Co.	199	207

Southern Mill Stocks

(Quotations furnished by A. M. Law & Co., Inc., Spartanburg, S. C.)

	Bid	Asked
Abbeville Cotton Mills	100	105
American Spinning Co.	240	255
Anderson Cotton Mills	85	90
Arcade Cotton Mills	72	77
Arcadia Mills	235	245
Arcadia Mills, pfd.	101	103
Arkwright Mills	99	105
Augusta Factory, Ga.	20	30
Avondale Mills, Ala.	875	925
Beaumont Mfg. Co.	...	400
Belton Mills	62	65
Bibb Mfg. Co.	175	185
Brandon Mills, pfd.	96	100
Brogon Mills	112	...
Brogon Mills, pfd.	96	100
Calhoun Mills	114	118
Chesnee Mills	125	130
Chiquola Mfg. Co.	275	285
Chiquola Mfg. Co., pfd.	96	99
Clifton Mfg. Co.	134	137
Clinton Cotton Mills	250	...
Columbus Mfg. Co., Ga.	136	140
Cowpens Mills	60	63
D. E. Converse Co.	109	112
Dallas Mfg. Co., Ala.	130	140
Darlington Mfg. Co.	85	90
Drayton Mills	100	...
Duncan Mills	92	94
Duncan Mills, pfd.	94	96
Eagle & Phenix Mills, Ga.	150	160
Easley Cotton Mills, pfd.	88	90
Enterprise Mfg. Co., Ga.	100	110
Gaffney Mfg. Co.	83	86
Gainesville Cotton Mills, Ga.	159	165
Glenwood Mills	120	130
Gluck Mills	95	101
Graniteville Mfg. Co.	135	...
Greenwood Cotton Mills	400	...
Grendel Mills	250	...
Grendel Mills, pfd. (par $50)	49	51
Hamrick Mills	130	140
Hartsville Cotton Mills	149	160
Inman Mills	155	160
Inman Mills, pfd.	103	...
Jackson Mills	200	...
Judson Mills	190	195
Judson Mills, pfd.	105	107
King, John P. Mfg. Co., Ga.	115	125
Laurens Cotton Mills	150	...
Limestone Cotton Mills	130	140
Marion Mfg. Co., N. C.	135	...
Marlboro Mills	45	47
Mills Mill	285	...
Mollohon Mfg. Co.	99	103
Monarch Mills	126	130
Monarch Mills, pfd.	100	103
Musgrove Cotton Mills	69	75
Newberry Cotton Mills	124	127
Ninety-Six Mills	150	...
Norris Cotton Mills	...	84
Orr Cotton Mills	100	103
Orr Cotton Mills, pfd.	96	98
Pacolet Mfg. Co.	205	210
Pacolet Mfg. Co., pfd.	102	105
Panola Cotton Mills, Class A, pfd. (par $90)	82	85
Pelham Mills	18	20
Pickens Cotton Mills	120	125
Piedmont Mfg. Co.	139	142
Poe, F. W. Mfg. Co.	110	115
Poinsett Mills	90	95
Riverside Mills (par $12.50)	9¼	9¾
Riverside and Dan River	...	195
Saxon Mills	84	87
Sibley Mfg. Co., Ga.	60	70
Spartan Mills	149	160
Toxaway Mills (par $25)	31	33
Union-Buffalo Mills	55	61
Union-Buffalo Mills, 1st pfd.	92½	94
Union-Buffalo Mills, 2nd pfd.	50	52
Victor-Monaghan Co.	104	106
Victor-Monaghan Co., pfd.	107	110
Ware Shoals Mfg. Co.	140	146
Watts Mills	...	70
Watts Mills, 1st pfd.	93	96
Watts Mills, 2nd pfd.	120	130
Whitney Mfg. Co.	90	95
Williamston Mills	195	...
Woodruff Cotton Mills	140	145
Woodside Cotton Mills	115	120
Woodside Cotton Mills Co., pfd	87	90

Northern Alabama Is Hopeful on Outlook

HUNTSVILLE, ALA.—A survey of the industrial conditions now prevailing in Northern Alabama shows that there has been a rapid improvement with the approach of fall. Numerous textile mills that have been idle or running on part time are beginning to get back to normal operation, and the same is true of practically every other line of industry. Cotton gins are generally running on full time and the cotton seed oil mills are beginning their season's runs to crush the seed that is rapidly accumulating. The mills here consume 50,000 bales of cotton annually and have an annual payroll in excess of $3,000,000. There are 300,000 spindles and 6,000 looms in the Huntsville mills of which the Merrimack with 108,000 spindles and 2580 looms, consuming 20,560 bales of cotton and giving employment to 1300 persons.

Wilmington's Cotton Trade

WILMINGTON, N. C.—Cotton valued at $17,000,000 was handled through the port of Wilmington during the fiscal year ending Aug. 31, according to statistics compiled by Alex Sprunt & Son, Inc., cotton exporters. Last fiscal year, or the year ending Aug. 31, 1924, there were 25,573 tons of cotton, four bales to the ton, handled through this port, valued at about $12,863,000, and indicating that the year just closed exceeded last year by over $4,000,000.

COTTON YARN MARKETS

Yarn Sales at Advance Less Numerous

Variation of Opinion as to High Cotton and Consequent Effect on Yarns

NEW YORK.—The attitude on the yarn market toward the recent advance in cotton is not unanimous. While it is admitted that the majority feel there is little likelihood of much lower prices to be witnessed within the next two or three months, there are those who regard the upward movement as speculative and destined to only temporary continuance. There are few who look for 30 cent cotton but 20 cent cotton is the hope of a still smaller number, with a resultant average in favor of a fair maintenance of quotations. The influence of these opinions on the yarn market has been equally varied with the result that while spinners' prices continue materially above those which obtained before the last cotton report was issued, buyers apparently are not apprehensive over further advances and claim to be able to secure yarn at figures below the average reported from the spinner.

Variation in Prices

The market on an average may be said to have advanced from 2 to 4 cents a pound over figures current previous to the issuance of the report. The reason for this range of advances being noted is that the most radical increases have been in the asking prices of sellers rather than in the figures quoted by the spinner. A little thought will serve to demonstrate the reason for this. The advances consequent upon the issuance of the report cut off almost immediately any further attempts at short selling which were more or less in evidence previous to that time. As some of the short sale prices were at least 2 cents below the market, it can easily be seen that the withdrawal of such propositions may have meant a bigger change in quotations than the spinner felt entitled to ask as a result of the new situation. It is true that as usual certain spinners put their prices at a point which withdrew their product from the market but others of a more reasonable frame of mind and with less feeling of certainty with regard to the continuance of cotton's upward movement went up gradually and conservatively. It may be said that the average spinner has not advanced his prices over 2 cents a pound since the first of the month. On the other hand, as an illustration of the material change that has resulted from sellers' refusal to sell the market short any further, the position of 20's single cones is in point. At the end of last

(*Continued on page 97*)

Cotton Yarn Quotations

(Corrected at close of business Sept. 16)

Spot Cotton Sept. 16, 1925—24.70c.; Sept. 17, 1924—22.50c.

Carded—(Average Quality)

Single Skeins and Tubes—(Warp Twist)

4s to 8s	—	—37½	20s	41½	—42
10s	—	—38	24s	—	—42½
12s	—	—38½	26s	—	—44
14s	—	—39½	30s	45½	—46
16s	—	—40	40s	—	—57

Two-Ply Skeins and Tubes

8s-2	—	—37	26s-2	46	—46½
10s-2	37½	—38	30s-2	47	—47½
12s-2	38	—39	36s-2	—	—55
14s-2	39	—40	40s-2	56	—57
16s-2	40	—41	40s-2 High breakage	59	—60
20s-2	41½	—42	50s-2	67	—68
24s-2	45	—45½			

Single Warps

10s	—	—39	24s	—	—44
12s	39½	—40	26s	—	—45
14s	—	—40	30s	46½	—47
16s	—	—41	40s	56	—57
20s	42	—43			

Two-Ply Warps

8s-2	—	—38	24s-2	45½	—46
10s-2	—	—39	26s-2	46½	—47
12s-2	—	—40	30s-2	48	—49
14s-2	40½	—41	40s-2 ordinary	57	—58
16s-2	41	—42	50s-2	—	—68
20s-2	42½	—43			

8s-3 and 4-ply skeins and tubes: tinged, 35-35½c.; white, 37-37½c.

Hosiery Cones (Frame Spun)

8s	—	—38	22s (silver and Jaeger)	44	—45
10s	—	—38½	24s	43	—43½
12s	—	—39	26s	44	—44½
14s	—	—39½	30s tying in	44½	—45
16s	—	—40	30s extra quality	47	—48
18s	—	—41	40s	—	—57
20s	—	—42			
22s	—	—42½			

Combed Peeler—(Average Quality)

Warps, Skeins and Cones

20s-2	56	—58	50s-2	—	—80
30s-2	61	—62	60s-2	90	—92½
36s-2	67½	—68	70s-2	97½	—1 00
40s-2	70	—72½	80s-2	117½	—1 20

Singles

12s	45	—46	30s	56	—58
14s	46	—47	38s	64	—67
16s	47	—48	40s	66	—68
18s	48	—49	50s	76	—79
20s	49	—50	60s	82½	—85
24s	52	—53	70s	92½	—96
28s	54	—56	80s	1 10	—1 15

Mercerized Cones—(Combed, Ungassed)

26s-2	71	—73	50s-2	92	—94
30s-2	74	—75	60s-2	1 00	—1 05
36s-2	78	—80	70s-2	1 15	—1 18
40s-2	83	—84	80s-2	1 33	—1 35
45s-2	86	—87			

Peeler—(Super Quality)

Single Cones

	Carded		Combed			Carded		Combed	
10s	40	—42	50	—52	26s	45	—47	58	—60
14s	41	—43	51	—53	30s	48	—50	60	—65
16s	41½	—43	52	—54	36s	54	—56	68	—70
18s	42	—44	53	—55	40s	58	—60	72	—78
20s	42½	—44	54	—56	50s	—	—	82	—88
24s	44	—46	56	—58	60s	—	—	92	—98

Combed Cones, Warps and Tubes

20s-2	63	—65	40s-2	76	—81
24s-2	65	—67	50s-2	82	—87
28s-2	66	—68	60s-2	90	—95
30s-2	67	—69	70s-2	1 00	—1 10
36s-2	73	—75	80s-2	1 15	—1 20

Combed Reverse Twist Thread Yarns—Skeins, Tubes or Cones 2, 3, and 4-ply

	Peeler Average		Best		Sakelarides Average		Best
24s	—	—80	77	—82	Nominal	....	Nominal
30s	—	—83	80	—85	Nominal	....	Nominal
36s	—	—85	85	—87	Nominal	....	Nominal
40s	—	—89	90	—92	Nominal	....	Nominal
45s	—	—94	95	—97	Nominal	....	Nominal
50s	—	—99	1 00	—1 02	Nominal	....	Nominal
60s	—	—1 09	1 10	—1 15	Nominal	....	Nominal
100s	—	—			....	....	2 00—2 70

Rapid Advance Confuses Buyers

Prices Up Two Cents Within a Week—Trading Continues Active — Contracting

PHILADELPHIA.—Carded yarns have advanced one to two cents since last week, upon strength of raw cotton and curtailed production among spinners in the south because of lack of sufficient water for power, being the case particularly in the Carolinas. This is credited with being the major factor in raising yarn prices to their present level, being even more important in this respect than the rise in raw cotton although this has, of course, been a factor of first importance. However, there is a general lack of stock yarns both in carded and combed, in this market and in spinners' possession. Manufacturers have, in most instances, allowed stocks to become low so there are few reserves to call upon to meet the present curtailed output and active demand. Weaving quotations have been raised two cents during the week while ordinary knitting is quoted on a basis of 38c for 10s. Combed and mercerized are stronger in sympathy with the rest of the market.

Rapid Advance

While trading during the early part of the week was less active than it has been during recent weeks, this was due to the fact buyers had not caught up with the advance and were still endeavoring to buy several cents under spinners' prices. There is, however, a good interest from both knitters and weavers at the current level. Many mills which could have purchased three weeks ago at 39c for 20s-2 warps are now paying 42c to 43c, a large order being placed at the former price. Buyers are confronted with a situation different from any they have experienced during the last few years, that of not being able to buy spot lots from dealers as required. Dealers are not in position to offer them this service in most counts but are compelled to order from their spinner so the manufacture must wait for delivery if he has neglected to place contracts. This fact is causing many to come into the market for larger amounts to be delivered farther ahead than for many weeks.

Spinners Firm

Spinners are quoting 20s-2 warps at 44c to 45c, comparing with sales in this market a week ago at 40c to 41c. Sales have been made in volume this week at 42c with a smaller volume booked at a cent higher, this figure being lower than the ordinary spinner will consider, as the majority

ABERFOYLE MANUFACTURING COMPANY

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CHATTANOOGA, TENN.

READING, PA.

Adams-Franklin Building
CHICAGO

Westaway Building
HAMILTON, CANADA

MILLS
CHESTER, PA.

Cotton Yarn Markets—Continued

MANCHESTER YARN CABLE

Manchester, Eng., Sept. 16 (Special Cable to TEXTILE WORLD).—Yarns of American cotton are attracting increased atttention, but full prices not easily obtained. Slightly better sales in Egyptian yarns.

hold firmly at 44c as a minimum. There is little stock of this count here and dealers state quotations had become too low in comparison with coarser numbers of the same grade. Quotations of 30s-2 warps average 49c to 50c from spinners, comparing with 47c to 48c a week ago when dealers sold at 46c. A large inquiry for 20s warps developed prices from spinners ranging from 43c to 44c, the business being placed at 42c. Men's wear and dress goods manufacturers have been active buyers and have taken medium sized quantities this week, buying farther ahead than heretofore.

Knitting Demand Good

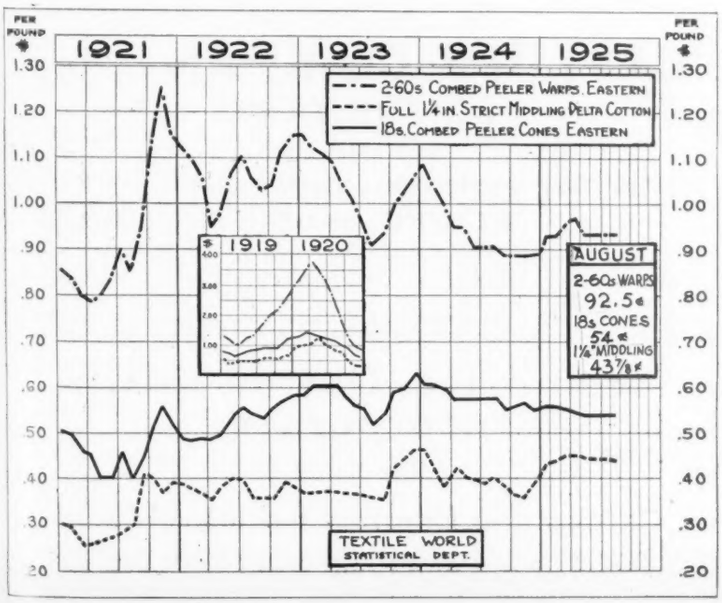
Knitting demand has become slightly less active at present level of prices. Manufacturers are willing to buy large amounts below the figures spinners ask but find few willing to bargain with them. Although sales to hosiery and underwear mills up-state have been active for several weeks, there is a general feeling among dealers there is yet a large amount of buying still to be done as these mills have enjoyed the largest season they have had for several years past. There has been good volume of sales in coarse counts for heavyweights and 26s and 30s for lightweights. While this interest has been less active this week a number of large inquiries have been made and several important sized sales of 30s extra-quality have been made at 46c to 47c, comparing with sales three weeks ago of good size at 43c, representing the lowest point this count has reached this season. Ordinary carded is held at 38c to 39c for 10s by spinners while dealers have taken orders as low as 37c basis for 10s and 40c for 20s.

Combed and Mercerized Active

Combed yarns continue in a strong position and for the first this may also be said of single combed qualities, which for the last two years have been difficult to move in this market because of the large stocks held by certain dealers, who quoted lower prices than their competitors could meet in order to liquidate them. It is reported stocks of such counts as 18s, 20s, and 24s, have been sold and additional amounts are dependent upon deliveries from spinners. It is probable quotations of these yarns will now become firmer and more in line with the two-ply. Demand for two-ply continues active and prices are higher, sales of 60s-2 being reported up to 92c with others at 90c, although mercerizers state they are able to buy at 87c. Mercerized qualities are moving briskly and in large quantities at slightly higher prices.

Southern Yarn Bulletin

CHARLOTTE, N. C.—The cotton yarn bulletin of the Southern Yarn Spinners Association issued under date of Sept. 10, states in part: "Yarn prices have advanced over last week's level. Trading however is still spotty, and buyers unwilling to contract ahead. The Government report of Sept. 8 indicates a smaller yield than had been anticipated, and the future market has responded accordingly. The size of the crop how-



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CONES, TUBES, SKEINS AND WARPS

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MUSCOGEE MFG. CO.

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All of COLUMBUS, GA.

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Superior Quality Knitting Yarns

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8s to 30s Extra Carded

JAMES E. MITCHELL COMPANY

Cotton Yarns

Philadelphia Boston

GATE CITY COTTON MILLS

Manufacturers of

Superior Quality

WHITE KNITTING YARN on CONES

We sell direct to Knitters and guarantee satisfaction

217 Trust Co. of Georgia Bldg., ATLANTA, GA.

COTTON PRODUCTS COMPANY

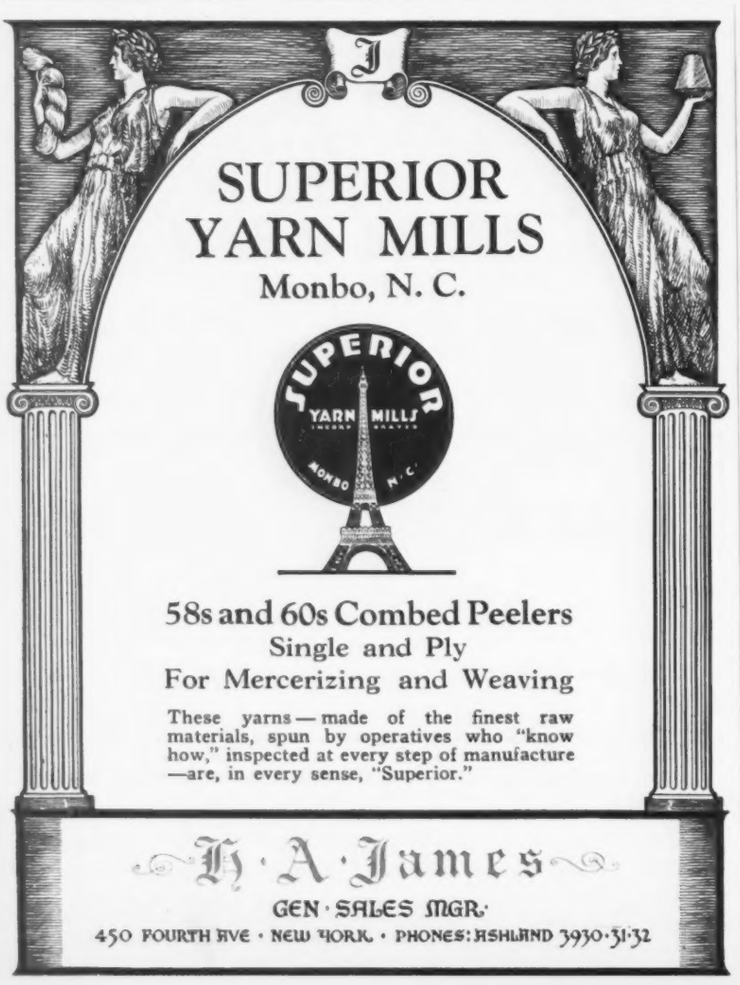
Bankers Trust Building Philadelphia, Pa.

High Grade Warps for MERCERIZING

Selling Agents for

The ELMORE COMPANY, Spindale, N. C.

SINGLE MERCERIZED YARNS



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Monbo, N. C.

58s and 60s Combed Peelers

Single and Ply

For Mercerizing and Weaving

These yarns — made of the finest raw materials, spun by operatives who "know how," inspected at every step of manufacture —are, in every sense, "Superior."

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COTTON YARNS

SOLE AGENTS FOR

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TREMONT and SUFFOLK MILLS

[and other mills furnishing full range of all numbers

NEW YORK BOSTON PHILADELPHIA CHICAGO

Icemorlee Cotton Mills Incorporated

Mills 1 and 2

Carded and Combed Knitting Yarns

Selling Agents: CAMPBELL & VAN O'LINDA

202 Union Station UTICA, NEW YORK

Cotton Yarn Markets—Continued

ever, and the probable range of prices is still a matter of considerable speculation. The drouth condition in the Carolinas and Georgia is still unrelieved. Even with the two day's enforced curtailment, the water situation is acute and unless relieved, further curtailment is to be expected. Not only does the curtailment pertain to customers of Southern Power Co., but individuals generating their own power are likewise affected. September, October and November are in normal years the lowest in average of rainfall. Cotton yarn stocks are at a minimum and, due to the enforced curtailment, prompt deliveries are impossible. If continued curtailment is necessary, unquestionably there will be a material shortage of available yarns for prompt delivery."

Cotton Yarns Improve

Trend Toward Stabilization on Higher Level

BOSTON.—The cotton yarn market seems to be no longer the one sided proposition that it has been over too long a period and sellers all along the line, particularly in carded yarns, are able to obtain more favorable prices for their products. It is said in some quarters that the turn of the market has come and that expectations of a bumper crop of cotton are likely to be disappointed and that already there is considerable purchasing by manufacturers on the supposition that while there may be the usual speculative fluctuations in cotton the average price is likely to move to a higher level. The spinners position is now considered to be considerably stronger. While there are many inquiries that cannot yet be converted into actual business, owing to slow development of confidence, the outlook is considered much more satisfactory on the feeling that low prices for standard counts of yarns are not likely to be seen again for some time to come, except perhaps in the case of spot lots for which sales must be made.

Demand for carded knitting yarns is better than for weaving yarns. Combed yarns are firm and are expected to shortly follow carded yarns in the upward trend. Weavers continue to resist advances but this is not peculiar to the cotton yarn market being for a long period a feature in worsted and woolen yarns. No particular expedition seems to be demanded on the placing of orders, the movement towards stabilization and a satisfactory price basis moving slowly by evolutionary rather than by revolutionary methods.

In some quarters it is said that surplus stocks of yarn continue to show in a keenly competitive market and many buyers evidently feel that if they can wait until the larger bulk of the crop is moving they can secure more attractive prices on yarn. In other sections buyers show a strong disposition to cover for their future requirements whenever they can find spinners to meet them half way on their ideas of value. The trend in prices is upward for the moment.

Sees Benefit from Curtailment in South

WINSTON-SALEM, N. C.—September 14—The enforced curtailment of operation and numerous shutdowns of cotton mills in the Carolinas and other southern States on account of shortage of power caused by the extended drouth of the last few weeks, is going to react to the benefit of the textile industry, according to cotton mill owners who have expressed themselves during the last few days.

The voluntary curtailment affecting several million southern spindles and a much larger number in New England saved the industry from disaster, these mill men aver, but more curtailment was needed to strengthen the market and this further curtailment is being enforced as a result of the continued drouth conditions that are affecting not only the entire Piedmont section in which the Southern Power Co. operates, but practically all of Georgia, Alabama and a part of Tennessee.

While textile men cannot see much improvement in trade conditions in the future, aside from the steadying of the market from curtailment, the most encouraging feature is found in the fact that practically none of the southern mills has any accumulations of stocks in warehouse. A year ago there was a considerable quantity of yarns and goods in mill warehouses and the market was continually weakened as a result of offerings from these stocks, often below the actual cost of production.

Inasmuch as accumulated stocks brought over from the previous year, in addition to this year's product, have been sold, it is easy to conclude that the actual consumption of cotton goods during the last twelve months has exceeded the production. This is regarded as a decidedly hopeful sign.

FAYETTEVILLE, TENN. The Elk Cotton Mills have been closed down because the water supply of the city is running so low that enough water cannot be spared to operate the boilers of the plant, which is operated by steam power. The male operatives have been offered work on the construtcion of the water line which will bring an ample supply of water from Tolley Spring, a distance of thirteen miles, to the Fayetteville reservoir. The new line will be completed within a short time. Women operatives of the Elk mills will receive half pay during their enforced idleness.

WARREN, R. I. Three hundred more looms were started up at the Parker Mills here, on Sept. 14, making the total number in operation 1,400 at the present time. The mills have also returned to a full week schedule of 48 hours. There is no change in the situation at the Warren Mfg. Co., where a five day schedule is still in effect, although prospects for better business are seen by the owners.

CANNON YARNS

Cotton Yarns *of* Quality

Quality:—We invite inquiries from the Knitter who puts *Quality* above *Price*—Who is proud of his product and guards it jealously. *Cannon Yarns* are dependable—The same high quality is maintained year after year.

The yarn is the product of our own mills, and back of every pound is the guarantee of

THE CANNON MILLS
INC.
From Spinner Direct to Manufacturer
PHILADELPHIA

New York Providence Boston
Reading, Pa. Chicago Utica, N. Y.
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THE STANDARD OF VALUE & QUALITY

William Whitman Company, Inc.

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Arlington Mills	Lawrence, Mass.	Mary Louise Mills	Cowpens, S. C.
Monomac Spinning Co	Lawrence, Mass.	Tallapoosa Mills	Tallapoosa, Ga.
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Katama Mills	Lawrence, Mass.	Catherine Mills	Sylacauga, Ala.
Manomet Mills	New Bedford, Mass.	Sycamore Mills	Sycamore, Ala.
Nonquitt Spinning Co	New Bedford, Mass.	Cowikee Mills (Yarns)	Union Springs, Ala.
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Calhoun Mills	Calhoun Falls, S. C.		

This Company also handles a large part of the products of over one hundred other mills in the South.

COTTON YARNS
Combed and Carded
All Twists, Counts and Putup

Mule and Frame Spun
Knitting yarns, single and ply
Weaving yarns, single and ply
Splicing and Plaiting yarns
Mercerized and Gassed yarns
Dyed yarns and Bleached yarns
Thread yarns, grey and mercerized
Tire yarns
Crepe yarns
Voile yarns
Glove yarns
Webbing yarns
Embroidery yarns
Lace curtain yarns
Carpet yarns
Silk Filling yarns
Carded yarns for all purposes

COTTON CLOTH AND COTTON, SILK AND RAYON MIXTURES
All-Combed Goods in Grey for Converters

Voiles
Poplins and Broadcloths
Cotton Gabardines
Venetians and Sateens
Lawns and Organdies
Plain Canton and Tussah Filled Fabrics
Marquisettes
Crepes
Jacquard weaves
Specialties
Staple Southern print cloths

WORSTED AND WORSTED MERINO YARNS

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Men's Wear
Dress Goods and Silk Trade

for

Hosiery
Underwear and Rubber Trades

Yarns manufactured according to Government specifications
Worsted and Worsted Merino twisted with
Cotton, Mercerized or Rayon
Slub dyed Worsted and Merino Yarns

Catalogue will be
Mailed on application

WILLIAM WHITMAN COMPANY, INC.

WORSTED CLOTH

Staple and Fancy Serges
Pencil Stripes and Fancy Suitings
Mixtures
Vigoureux
Cheviots
Tropical Suitings
Gabardines
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In various widths
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Commercial-National Bank Building	CHARLO TTE, N. C.	Charlotte 4317

Cotton Yarn Markets—Continued

N. Y. Cotton Yarn Market

(*Continued from page* 91)

month this count sold as low as 38c. in a few instances and these sales were generally attributed to short interests. Today the market is fully 41c. if not more, and spinners are asking this price at least for 16's. Here is a full 4 cent range which, however, has not been the advance that the spinner has asked for. He never went below 40c. for this number last month and today is now over 42c. in his ideas, which means a difference of only 2c.

In spite of the fact that there is more freedom to operations and the volume of orders placed is considerably in excess of last month, buyers for the most part are not operating on any basis of fear that the market will get away from them. Where they need yarn for current requirements or for the near future they are willing to buy, although attempting to secure concessions from the generally quoted levels. Even though not successful in this attempt they are not increasing their commitments because of inability to get cheap yarn. In the underwear trade there is more inquiry and it is apparent that the volume of orders has been of satisfactory proportions. Weaving yarn buyers, however, are not evincing any large interest in the market except in a few isolated instances. The dress goods trade is centering their attention largely on 30's-2 warps to the discrimination of 20's-2 but the recent demand for coarse yarns seems to have dwindled materially and buying is negligible.

Hosiery Yarn Interest

Inquiry from knitters on hosiery yarns is centered largely on 16's, 20's, 22's and 30's. The first and last mentioned counts have been asked for with the greatest regularity but dealers find it difficult to obtain prices from the spinner in which the buyer would be interested. On 16's, spinners' quotations range from 40½ to 41½ but these figures are not what the knitter is willing to pay. It is difficult if not impossible to secure a firm offer at 39½c though it is admitted that if the buyer absolutely needed the yarn he would have to pay more than this figure. On 30's tying-in spinners are quoting as high as 47c. One spinner advanced his price on this count a cent a pound on Tuesday, despite the fact that cotton went off 50 points on that day. It would be very difficult to get anything under 46c from the spinner at this writing, but it is also questionable whether yarn could be sold at any such figure in New York State.

CLINTON, S. C. Lockwood, Greene & Co., engineers of Atlanta, Ga., and Boston, Mass., have been commissioned by the Clinton Cotton Mills, to supervise the complete electrification and new lighting system for Clinton Cotton Mill No. 2.

Waste Trend Improves

Choice Fly Sells High—Substantial Exports in July

BOSTON.—The cotton waste market continues to show slight improvement. Some mills are coming in for larger supplies and buying from the consumer end is rather on the increase. The advance in cotton is rendering prices stiffer and low quotations of last week have been replaced by rather higher ones. There seems to have been a rather urgent demand for very choice willowed fly and it is stated that as high as 14½c. has been paid for this material. The situation continues to show promise and in the course of the next few weeks, by which time the actual size of the new crop will be determined quite accurately, wastes will begin to do better, larger supplies will arrive and the latter part of the year will probably make up, in some measure at least, for the disappointing period covered by the first seven months of the year.

Although domestic demand in July was very thin there was considerable exporting, no less than 5,000 bales being shipped abroad from Boston to ten different countries. The largest export went to Great Britain and totalled 1,571,393 pounds at an average value of 19.3c per lb. Germany came next with 829,163 lbs., at an average value of 8.2c per lb. France, Belgium and Italy took small amounts.

The year to date has not been very profitable for the large membership of the Exchange. The fundamental explanation is that influenced by the general optimism manifested in all lines of textile industry at the beginning of the year, altogether too high prices were paid to the mills for all kinds of materials.

Current Quotations

Peeler comber	21 —21½c.
Peeler strips	20½—21c.
Egyptian comber	20 —20½c.
Choice willowed fly	10½—11½c.
Choice willowed picker	8 — 8½c.
Sak. strips	24½—25½c.
Linters (mill run)	6 — 7c.
Spoolers (single)	15½—16c.
Fine white cop	17 —17½c.

Cotton Waste Notes

Samuel H. Roberts, secretary of the American Cotton Waste Exchange, in an article entitled "Utilization of Cotton Waste" in the Annual Review Number of the Manchester English Guardian covering American cotton, points out that in English practice there is only one class of dealers, those who make contracts direct with the mills for their total waste production either for three or six months, while in the United States there are three distinct classes; the regular mill contractor who buys the mills output for the year, the cooperative waste concern which has come into existence during the last few years and, thirdly, the commission method of selling of comparatively recent origin.

J. B. JAMIESON COMPANY
COTTON YARNS
77 SUMMER ST. BOSTON, MASS.

Minimize your troubles—Insure maximum production
Weaving—COTTON YARNS—Knitting
Sold by
"Industrial"
are Good Yarns
INDUSTRIAL YARN CORPORATION
88 LEONARD STREET, NEW YORK

O. S. HAWES & BRO.
FALL RIVER, MASS.
COTTON YARNS ALL FORMS AND NUMBERS

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JESSE P. EDDY, Treas.
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COTTON YARNS
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Telephone—Murray Hill 0614-0615

JOHN F. STREET & CO.
COTTON YARNS
201 Industrial Trust Bldg. PROVIDENCE, R. I.
CHICAGO PHILADELPHIA NEW YORK

EWING-THOMAS CONVERTING CO.
Specialists in Mercerized Yarns CHESTER, PA.
Warp Mercerizing for the Trade
Gassed—Natural—Bleached—Colors
DOUBLE MERCERIZED SPECIAL PROCESS

Early Bloom Cotton

Quissett gets the cream of the cotton fields.

The selection is made exclusive'y from the early bloom crop, and is limited to the finest staple cotton.

Furthermore, the quality of the raw stock is preserved and enhanced in every step of manufacture.

It isn't sufficient to call the finished product "cotton yarns." They are more than that —which explains why we have found it necessary to designate them as "Quissett Quality Yarns."

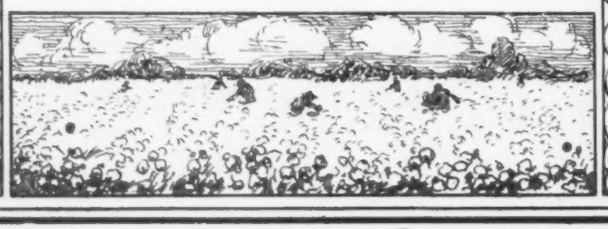
Carded and Combed Cotton Yarns in all Numbers and Descriptions.
Ply Yarns our Specialty.
Egyptians, Sea Island, Peelers, Sakelarides, Pimas and Peruvians.

Quissett Mill

New Bedford, Mass.

Wm. M. Butler, Pres.
Edward H. Cook, Treas.
Thomas F. Glennon, Agent

QUISSETT MEANS QUALITY



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Novelty Yarns
of Every Description

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ROTTENBERG SONS CO., Inc.

YARNS FOR KNITTING TRADE

564 Broadway :-: :-: NEW YORK

Quality First

COTTON **CLARENCE L. MEYERS YARNS** SILK

2d and Somerset Streets, PHILADELPHIA

THE J. R. MONTGOMERY CO. WINDSOR LOCKS, CONN.

MERCERIZED COTTON YARNS Manufacturers of Give the high Silk-like lustre
In Knit Goods and Woven Fabrics

NOVELTY YARNS Poucle, Bourette and Spirals in Cotton Wool, Worsted, Mohair and Silk.

COTTON WARPS On Beams, Jacks, Spools and Tubes In Fancy Twist, Colors and Printed

MONUMENT MILLS, Housatonic, Mass.

HIGH GRADE COTTON YARNS White, Colors, Bleached
On Beams, Jack Spools, Cones, Skeins, and Chain Warps

FAST-BLACKS & COLORS { For Woolen Mills a Specialty } WE SELL DIRECT

COTTON YARNS PLUS SERVICE

ANY COUNT OR VARIETY EASTERN OR SOUTHERN GREY OR PROCESSED

Advice Based on Our Experience of Thirty Years in Bleaching, Dyeing, Mercerizing, Etc., at Your Service

E. J. McCaughey, 51 Arlington St., Pawtucket, R. I.

COTTON WARPS

DANA WARP MILLS Westbrook, Maine

Cotton Yarn and Warps, Carded and Combed

WHITE and COLORED SINGLE and PLY SELL DIRECT

COTTON MARKETS

Cotton Rise Checked At The 25 Cent Level

Buying on Reduced Crop Estimates Stimulated by Increased Demand for Cotton Goods

The buying movement which started in the cotton market shortly after the publication of the last Government crop report, continued in broadening volume until prices neared the 25c level. At 24.95 for December on Tuesday, the disposition to take profits became more general, while it looked as if the higher prices were bringing in a little more hedge selling, and reactionary sentiment developed. This was not surprising after an advance of about 285 points from the low levels of Aug. 31, which had naturally left the market in an easier technical position, and the selling proved sufficient to send prices off rather sharply on Wednesday. Bullish views remained very much in evidence, however, owing to the recent reduction in ideas of the crop and a belief that the smaller supply figures had made a sufficient impression on the trade at large to bring in buying against consuming requirements on all important declines.

The advances during the earlier part of the week were due to a belief that the otherwise beneficial rains in the Southwest were too violent and were doing more damage to cotton open in the fields than good to the plant. It was believed also that in spite of lower temperatures, the crop in the drouthy sections of the Eastern belt continued to deteriorate, and the chances are that the market was discounting expectations that the next Government report would reduce the crop indication to around or below 13½ million bales. The last weekly report of the Weather Bureau did not altogether encourage smaller estimates of the yield, as it referred to an improvement in crop prospects in some parts of Texas and with the appearance of clearing weather in the Southwest on Wednesday, there was a hope that the rains might actually add to the crop in the event of a favorable growing season.

The advances on the reduced estimates of the crop were promoted by reports of increased activity in the cotton goods market and of a firmer spot basis in the South. The feeling appeared to be that the reduction in crop views had caught the trade short of both raw material and goods, and that efforts were being made to cover requirements on the advancing market. Toward the middle of the week, however, there were reports that the higher prices were restricting business in goods and that spots were being offered a little more freely in the interior. It is probable that the reports of a firmer basis heard earlier in the week referred largely to cotton showing staples of an inch or over. Owing to premature opening early receipts are running poor as to staple although very well as to grade and the rumor has been that 28-29 mm cotton was hard to find in sufficient quantity to fill out September shipments.

The following table will show Wednesday's closing quotations in the leading spot markets of the country, with the usual comparisons:

Market	Sept. 9	Sept. 16	Ch'ge	Last year	Sales
Galveston	23.25	24.40	+115	21.70	14,915
New Orleans	22.85	24.00	+115	21.50	91,407
Mobile	22.60	23.75	+115	21.25	5,621
Savannah	22.77	24.20	+143	21.51	2,905
Norfolk	23.00	24.25	+125	21.63	154
New York	23.55	24.70	+115	22.50	.....
Augusta	22.69	24.13	+144	21.31	3,844
Memphis	23.25	24.00	+ 75	22.00	18,825
St. Louis	23.50	23.75	+ 25	22.00	.....
Houston	23.00	24.35	+135	21.75	117,955
Dallas	22.30	.....	.....	20.80	82,290

The following differences on and off middlings are given as compiled from the reports received by the New York Cotton Exchange. The cotton grades marked ** are not delivered on contract:

	Dallas	Memphis	Montgomery	Augusta	Average
WHITE GRADES					
M. E.	.90†	1.00†	.88†	1.00†	.96†
S. G. M.	.75†	.75†	.63†	.75†	.72†
G. M.	.50†	.50†	.38†	.50†	.48†
S. M.	.38†	.25†	.25†	.25†	.28†
S. L. M.	.60*	.50*	.63*	.56*	.59*
L. M.	1.25*	1.00*	1.40*	1.50*	1.38*
S. G. O.**	2.25*	2.00*	2.40*	2.50*	2.42*
G. O.**	3.50*	3.00*	3.40*	3.50*	3.52*
YELLOW TINGED					
G. M.	.50*	.50*	.25*	.25*	.30*
S. M.	.75*	.75*	.75*	.75*	.68*
M.**	1.25*	1.00*	1.50*	1.50*	1.46*
S. L. M.**	2.50*	1.50*	2.50*	2.50*	2.34*
L. M.**	3.00*	2.00*	3.50*	3.75*	3.28*
YELLOW STAINED					
G. M.	1.25*	1.50*	1.50*	1.50*	.80*
S. M.**	2.00*	1.75*	2.00*	2.00*	1.30*
M.**	2.50*	2.00*	2.75*	3.00*	1.98*
BLUE STAINED					
G. M.**	1.75*	2.50*	1.25*	1.38*	1.54*
S. M.**	2.00*	2.75*	1.75*	1.50*	1.93*
M.**	2.75*	3.00*	2.50*	2.50*	2.70*

Cotton Statistical Data

(Fluctuations of Futures, N. Y.)

	Closed Sept. 10	High	Low	Week Closed Sept. 16	Chge
Sept.	23.36	24.26	23.36	24.24	+ .88
Oct.	23.54	24.59	23.42	24.44	+ .90
Nov.	23.69	24.65	23.49	24.60	+ .91
Dec.	23.85	24.95	23.71	24.77	+ .92
Jan.	23.81	24.27	23.18	24.03	+ .22
Feb.	23.46	24.40	23.46	24.18	+ .72
March	23.61	24.70	23.51	24.33	+ .72
April	23.76	24.69	23.76	24.49	+ .73
May	23.92	24.87	23.80	24.65	+ .73
June	23.81	24.80	23.81	24.41	+ .60
July	23.71	24.50	23.58	24.36	+ .65

Spot Fluctuations for Week (Middling)

	N York	N Orleans	L'pool
Fri., Sept. 11	23.95c.	23.22c.	13.01d.
Sat., Sept. 12	24.25c.	23.62c.	13.17d.
Mon., Sept. 14	24.75c.	24.05c.	13.44d.
Tues., Sept. 15	24.30c.	23.62c.	13.53d.
Wed., Sept. 16	24.70c.	24.0?c.	13.43d.
Thurs., Sept. 17	24.65c.	24.23c.	13.63d.

Spot Fluctuations and Stocks

	Prices Sept. 16	Stocks This Week	Last Year
Galveston	24.40	104,970	124,746
New Orleans	24.00	186,744	71,186
Mobile	23.75	28,583	10,216
Savannah	24.20	122,353	48,293
Charleston	.....	29,990	19,858
Wilmington	.....	14,227	3,464
Norfolk	24.25	15,297	15,145
Baltimore	24.00	857	861
Augusta	24.13	62,445	23,748
Memphis	24.00	33,542	22,103
St. Louis	23.75	867	2,055
Houston	24.35	245,807	177,666
Little Rock	24.38	15,272	7,350

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Cotton Markets—Continued

More Activity in South

Government Report Stimulates Interest in Cotton

MEMPHIS, TENN., Sept. 14.—The cotton market here has become suddenly active since publication of the Government's report on the condition of the crop. Belief that the crop has deteriorated heavily since Sept. 1, has probably been the larger influence. Some estimates are now running under 13,000,000 bales, but they are looked upon as extreme. Activity amounts almost to a scramble for cotton with inch and better lengths in relatively best demand. Shippers and exporters have heretofore denied having entered upon any great amount of forward business, but present demand upon intermediates suggests that the spot short interest is considerably larger than has been admitted. Some claim that much of the recently developed demand is to fill a large order, prompt shipment, for Russia, but the character of the cotton sought suggests some other destination.

Country cotton is offered less freely and basis has stiffened. Inquiry from domestic mill centers, and for the continent is good, and Liverpool inquiry, heretofore slack, is improving, although shippers and exporters still say they are accepting little new business. A few bales of strict middling 1 5/16s staples were sold here late in the week at 32½c, first cost; this cotton is now quoted at 34c. Other sales since publication of the Government report were as follows: strict middling 1⅛ staples 25 to 26c, full 1⅛ 27 to 29c, 1 3/16 29 to 31c, and 1 ¼ 32 to 33c. The approximate buying basis, first cost, middling inch cotton is even to 25 points off Decembers New York; 1 1/16 100 on, and 1 1/16 to 1⅛ 150 on.

Weather conditions early in the week continued unfavorably hot and dry. Temperatures at Memphis ranged as high as 103, and in some parts of Memphis territory as high as 109. Farmers claim the crop suffered severely; it was too hot to pick cotton during the middle of the day, although heat further hastened opening. Rains, quite general over the belt, and of which this territory has had a fair share, were also counted as unfavorable, but opinion is conflicting. No doubt the grade of open cotton will be lowered. A little time will be needed to note results. Rains, quite likely, may temporarily cause shedding, and it is now so late that new fruitage may be caught by frost. A prolonged wet spell would be extremely bad, but if the weather now clears, as appears probable, recent rainfall will probably prove far more beneficial than otherwise. Picking and ginning have progressed at a great rate. The problem of obtaining sufficient labor to pick the crop promptly is as yet unsolved.

Market Statistics

Basis Middling

	Saturday Sept. 12	Saturday Sept. 5
10 Markets Average..	*23.67	22.07
Memphis	23.50	22.25

Premium Staples

First Sales from Factors Tables at Memphis

Grade Strict Middling	Prices Firm
1 1/8-in.....	27@29c
1 3/16-in.....	29@31c
1 1/4-in.....	33@35c

Current Sales

	For week	Prev. week	Week before
Memphis Total....	14,350	13,200	14,125
F. O. B. Included..	11,675	11,975	13,875
10 Markets.....	193,683	154,986	141,245

Memphis Receipts, Shipments, Etc.

	For week	Last year	Year before
Gross Receipts	17,399	6,420	7,553
Net Receipts	10,581	912	453
Totals since Aug. 1, net	16,252	2,229	1,304
Shipments	8,156	6,720	10,092
Total since Aug. 1...	24,140	33,069	34,438
Total Stock	20,485	21,868	47,703
Decrease for week....	9,243	*309	*2,539
Unsold Stock in hands of Memphis factors.	9,503	4,000	.....

*Decrease.

Staple Cottons Advance

Rising Prices for Foreign and Domestic Staples

BOSTON.—Prices on both Egyptian and domestic cottons show strong advances for the week. Buyers of domestic staple in the South are finding difficulty in purchasing September commitments and basis has jumped from ½ to ¾c per pound. Everything in sight is being bought. The prospect of heavy rains has raised premiums on all the better grades.

Average prices for Sept.-Oct. shipments of middling and strict middling hard western cotton (full lengths) are as follows:

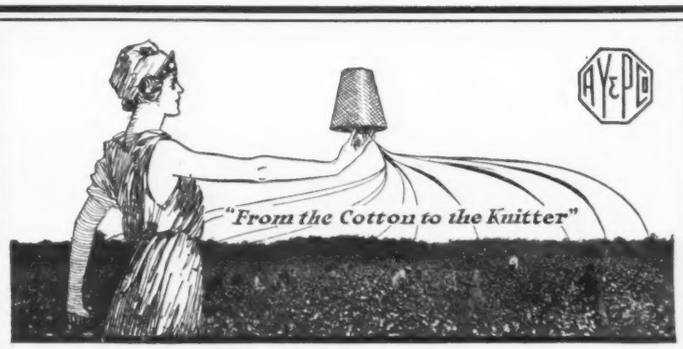
1 1/16 in. to ⅛ in.....	28½to29½c.	29½to30½c.
1 1/16 in.	27¾to28¾c.	28¾to29¾c.
1 ⅛ in.	29½to30½c.	30½to31½c.
1 3/16 in.	31½to32½c.	32½to33½c.
1 ¼ in.	34½to36½c.	36½to37½c.

John Malloch & Co., Boston, quote Egyptian cotton, c. i. f. Boston for Nov.-Dec. shipment as follows: Medium Sakellarides 50¼ up 2c, Medium Uppers 35½ off 1 7/8c. They report closing prices Sept. 16 on the Alexandria exchange as follows: November (Sak.) $46.23 up 253 points: Oct. (Uppers) $32 up 205 points; Dec. Uppers $32.30, up 10 points from Sept. 9.

Egyptian Cotton Statistics

WASHINGTON, D. C.—Stocks of raw cotton at Alexandria Aug. 31 totaled 33,000 Egyptian bales of 750 lbs. gross, a decrease of 20,000 from stocks held at the end of July, Consul R. H. Geist cabled the Commerce Department. Raw cotton exports from Egypt during the month totaled 24,000 Egyptian bales, the same as in June. Arrivals at the port from the interior in August amounted to 4,000 bales, against 400 in July and 5,000 in June.

GRIFFIN, GA. Cotton mills around Griffin, including the Griffin Mfg. Co. and the Georgia-Kincaid Mills, are getting around the serious drought situation by securing water for their bleaching and dyeing operations through the drilling of artesian wells.



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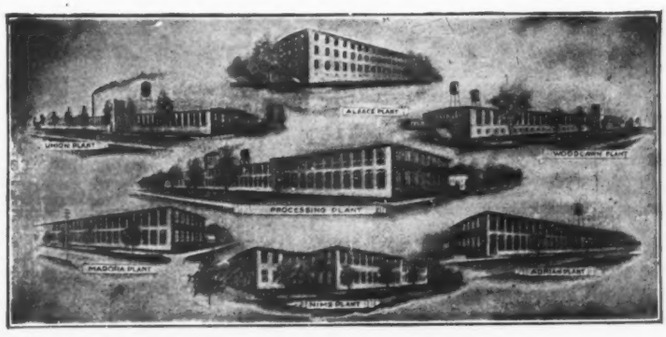

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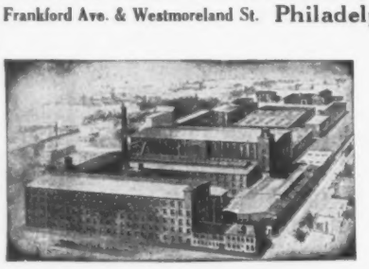

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WORSTED YARN MARKETS

Men's Wear Mills Are Buying Yarn

Active Interest in Balbriggan Qualities—Fair Sized Sales to Outerwear Trade

Taking the situation as an entirety, trading is of fair proportions, being exceptionally brisk in spots, fair in others while a number of lines still continue quiet. Interest in different yarns used in balbriggan cloth, straight worsted, worsted and rayon and merino, are all in good demand, with greatest activity so far as new business is concerned in worsted and rayon, a majority of this being for French spun qualities. Sales of mixtures and vigoreaux to men's wear mills are reported in good volume, orders ranging from 100,000 lb. lots down to 5,000 lb. contracts. Purchases by this trade to date represent a distinct improvement over that of a year ago. Dress good yarns are in poor request, being influenced at this time by tendency of worsted manufacturers to use cotton warps with rayon filling instead of worsted in goods of a boliva character.

Men's Wear Interest

Although men's wear manufacturers as a rule are not ordering large quantities in excess of their goods requirements, they have already placed a good amount of business with spinners of mixtures, many of the latter being sold well in advance for the next three months. A large number of mills that placed fair sized contracts earlier in the season have been compelled to place duplicate yarn orders to cover the goods orders they have received over that which they had estimated. Prices of vigoreaux and mixtures are steady, quotations approximating $2.50 for 2-40s, half blood, French spun mixtures, $2.40 for Bradford and $2.65 for 2-50s mixtures. Manufacturers requiring a single filling yarn for these fabrics are able to bargain more in these qualities than in vigoreaux and shading of prices by spinners in this group is less frequent.

Cotton and Rayon Used

Worsted spinners are having little success in selling manufacturers of boliva goods at present as they are, in a majority of cases, using cotton and rayon where they formerly used all worsted. This trend, however, is generally regarded as a distinct style tendency and not permanent as cotton and rayon can be turned out at a much lower price than worsted and yet present a very attractive appearance so far as color and sheen is concerned. The small volume of dress goods yarns selling to other lines runs largely to 2-50 Bradford with single warp and filling, the 2-50s being available at $2.25. Spinners look for demand to increase from these mills in the near future when styles are more definitely fixed and after a number of woolen manufacturers have turned over to worsteds, which they are contemplating at this time.

Balbriggan Situation

Views upon balbriggan goods, among spinners particularly, are becoming more divergent, many believing the top of the wave of popularity of this fabric has already been reached while others believe they see unmistakable signs that yarn demand from this trade has not touched the high mark but will continue throughout the winter and next spring. Whatever the future brings forth it has been the means of selling a large number of spinners catering to this trade, well ahead for the balance of the year, merino spinners in particular being well situated in this regard and several state they cannot take any more business before the latter part of the year. Spinners of rayon and worsted are in a like position, especially those working on French system which knitters have favored over the Bradford's spun qualities up the present for balbriggan use. A factor which is hurting this trade at present is the trend among a number of manufacturers to turn out a cheaper fabric made largely with cotton, having only a small percentage of wool which other manufacturers deplore.

Fair Outerwear Demand

Outerwear mills are not buying far in advance but are taking a respectable volume both on new and on old contracts now on spinners' books. Bathing suit manufacturers are receiving a healthy response from jobbers on their 1926 lines and as a result are taking in yarns on their old contracts at a lively rate, indicating in all probability that duplicate business will be placed before the end of the year by this trade. A number of spinners state they have sufficient business on hand, mostly going to these mills, to run them full time for the next three months. Sweater manufacturers are placing new contracts in medium sized amounts, not averaging more than 5,000 lbs. While this represents an improvement over the rate they purchased in June and July it is less than in August. Prices of 2-20s average quarter blood grade vary from $1.37 to $1.40 with most of current business placed at $1.37½ and higher quality at $1.42. Cooler weather is expected to cause a spurt in interest by this trade during next few weeks.

Spinners Following Wools

Hosiery and underwear demand is quiet, large business being placed earlier in the season and until the retail demand develops there will probably be only hand-to-mouth buying by hosiery mills. Prices of all yarns are fairly steady although considerable price cutting is reported when a large inquiry comes into the market. Spinners following this tendency are counting on the present softness in wool prices to continue which will permit them to buy at a lower level. A majority of spinners, however, have not lowered their quotations from those current during the last two months, but rather than lose business many will grant concessions since wools became softer. Stocks in manufacturers' hands are generally small and a larger demand would appear should any drastic reductions in prices occur.

BRADFORD TOP AND YARN CABLE

Bradford, Eng., Sept. 16 (Special Cable to TEXTILE WORLD).—Bradford topmakers find London rates too dear and market is generally surprised by strength of Continental competition. Prices for tops firmer and concessions difficult to obtain. Sixtyfours quoted at 49d.; 56s at 32d.; 46s carded at 21½d.; 2-48s Botany yarn at 5s. 7d. Steady business in yarns and spinners are more difficult to deal with.

Yarns Moving Forward

Lower Wool and Top Prices Necessary to Expansion

Boston.—The yarn market is without material change for the week but the movement is in direction of larger business though hardly at better prices for the moment. Desire for sufficient business to keep mills running to a larger extent is at the bottom of the acceptance of low prices but underneath such acceptances is the feeling that the turn has been taken and that more profitable business will show itself in due time. Spinners say that they cannot sell yarns in volume except on a low level and that they must have lower prices in wools, both foreign and domestic, as well as lower values in tops before any substantial and satisfactory expansion will take place.

Good demand is noticeable in fine merino knitting yarns for balbriggan both in the cotton and artificial silk mixtures. A large part of current business is confined to specifications on old contracts, but new contracts are appearing from time to time. Two such contracts are mentioned in this market on Bradford knitting yarns 2-20s at $1.35 and 2-26s at $1.37½c. These figures are considered below replacement values based on current wool prices. If these yarns are made from high ¼ blood, 50s, the manufacturing margin seems very small; if however from 48s for which there has been some little demand in tops recently, the margin is correspondingly larger. The top market it may be noted is no firmer than it was a week ago and still shows a downward tendency. The only large business in tops is being done at concession well below published minimum prices.

In the Bradford yarn market it is more difficult to buy medium and low crossbred counts. Improved output has made spinners more independent and they are holding out for firmer prices. Botany yarns however are unchanged though concessions probably can be obtained in most instances. In the Boston market it is said that most factors make each bona fide inquiry an issue direct between mill and buyer with more or less dickering before an order is placed. While the production of worsted yarns is unquestionably on the increase it is largely within the organization who do their own spinning for conversion into fabrics. Sales spinners so called are still indifferently placed and in need of substantial business.

Quotations

(Corrected to Close of Business Wednesday)

Bradford System

2-12s, low com. (36s)	1.15 -1.20
2-16s, low com. (36-40s)	1 17½-1.22
2-20s to 2-24s, low ¼ (44s)	1.25 -1.30
2-20s to 2-26s, ¼ bld. (46-48s)	1.35 -1.40
2-26s to 2-30s, ¼ bld. (48s)	1.40 -1.50
2-30s to 2-32s, ¼ bld. S.A. (46s)	1.45 -1.50
2-32s, ¼ bld. (48-50s)	1.55 -1.60
2-20s, ¾ bld (56s)	1.55 -1.65
2-26s, ¾ bld. (56s)	1.60 -1.70
2-36s, ¾ bld (56s)	1.65 -1.75
2-32s, ½ bld. (60s)	1 85 -1.95
2-36s, ½ bld (60s)	1.95 -2.05
2-40s, ½ bld. (60-64s)	2.00 -2.10
2-50s, high ½ bld. (64s)	2.25 -2.30
2-50s, fine (66-70s)	2.30 -2.35
2-60s, fine (70s)	2.95 -3.05

French System

20s, ¼ bld. (48s)	1.50-1.60
20s, high ¼ bld. (50s)	1 60-1 70
20s, ¾ bld. (56s)	1 75-1.80
30s, ¾ bld. (56s)	1.80-1.85
30s, ½ bld. (60s)	1.85-1.90
40s, ½ bld. (60-64s)	2.00-2.10
50s, (66-70s)	2.35-2.45
60s (70s)	3.00-3.10

Knitting Yarns in Oil (Bradford)

2-20s, low ¼ bld. (44s)	1.25-1.30
2-18 to 2-20s, ¼ bld. (48s)	1.37-1.42
2-26s, ¼ bld. (48s)	1.42-1.47
2-30s, ¼ bld. (48s)	1.47-1.52
2-20s, ¾ bld. (56s)	1.60-1.65
2-20s, ½ bld. (60s)	1.95-2.00

French Spun Merino, White

30s, 50-50	1.60-1.65
30s, 60-40	1.73-1.80
30s, 70-30	1.85-1.90
30s, 80-20	1.95-2.05

BRANCH RIVER WOOL COMBING CO., INC.

COMMISSION COMBERS

Works:

NORTH SMITHFIELD, WOONSOCKET, R. I.

Boston Representative:

Frank L. Sutcliffe, 263 Summer Street

Worsted Yarn Markets—Continued

Top Prices Unsteady

Spinners Pressing for Lower Level of Values

BOSTON.—Tops both in Boston and Bradford are a trifle softer this week. No particular decline, but an easing off in several of the qualities which may be considered an indication that stabilization is not yet completed. In Boston, business is still slow with standard top makers offering determined resistance to pressure for lower prices. When wools decline, tops will accommodate themselves to the situation and in the meanwhile sales spinners who are in receipt of business can by shopping around obtain moderate volume of tops slightly under the lower edge of quotations following this market.

The tendency still seems downward. Business in average ⅜ blood tops is offered at $1.17 against the quotation of $1.20–$1.22; in high ⅜ blood $1.20 is mentioned as against $1.25–$1.28; in ½ blood $1.40 as against $1.47–$1.50. Business even at the lower prices is not being placed in any large volume.

The noil market is inert. Mill buying is near the minimum. Prices tend to decline. By the end of the month additional orders received for lightweight and heavyweight fabrics calling for these commodities in their construction may put a better complexion on the face of the market. Noils are standard necessity to many types of woolen goods. They cannot be thrown into the discard nor neglected over too long a period. Consuming mills seem fairly well supplied at the moment.

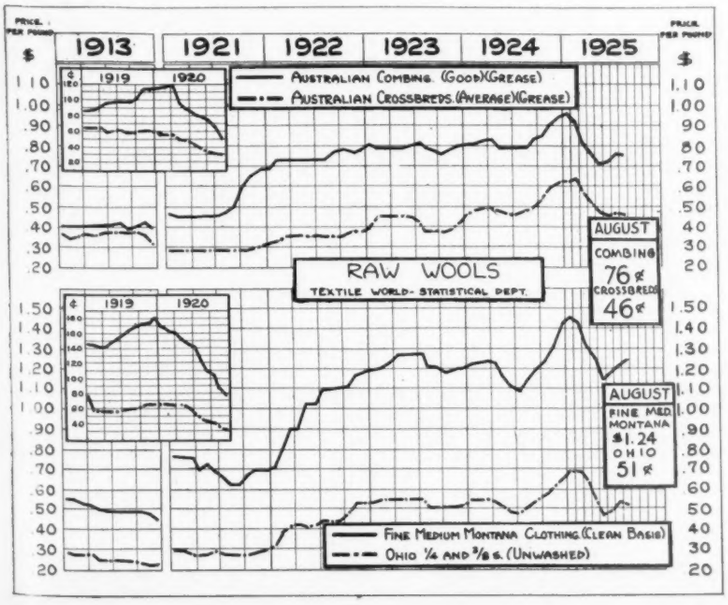
That larger supplies of domestic made materials are not arriving seems rather unaccountable and the explanation usually given is that the greater part of wool combing at this time is being done by mill organizations which can consume their own by-products. As the season now operating runs largely to the finer counts it is difficult to see how fine noils can be kept permanently above $1.00 per lb. Quotations at this time is 95–$1.00. Imports in recent weeks have been falling off considerably. The strike of wool workers in Bradford interfered with shipments. This has allowed American purchasers in that market opportunity to cancel part of their commitments.

Current Quotations

Tops	
Tops	
Fine (64–66s)	$1.60–$1.6[illegible]
Half-blood (60–62s)	1.45– 1.50
High ⅜ blood (58s)	1.25– 1.28
Aver. ⅜ blood (56s)	1.20– 1.22
Low ⅜ blood (52–56s)	1.17– 1.18
High ¼ blood (50s)	1.05– 1.07
46s	.97– .98
44s	.90– .92
40s	.85– .87
36s	.85– .86
Noils	
Fine	$.95–$1.00
Half-blood (60–62s)	1.45– 1.50
High ⅜ blood	.80– .85
Aver. ⅜ blood	.75– .80
Low ⅜ blood	.70– .75
High ¼ blood	.65– .70
46s	.55– .60
44s	.45– .50
40s	.45– .50

Pile Fabrics for Children's Coats

Thick pile materials are much in evidence in the current showings of children's coats, according to the United Infants,' Children's and Junior Wear League of America, and beaver, squirrel and other soft furs are extensively used in collar and cuff trimming. In the League's membership there are a number of houses displaying hats with the coats. The hats may be of felt or velvet, not matching exactly the material of the coat, but harmonizing in shade. In these cases hat houses display coats in their showrooms as a return courtesy. A novelty in the lines made for children from one to three years of age, is the blanket set, composed of coat and hat made of two-faced blanket material, usually of some light shade with touches of embroidery for trimming.



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Office and Mills *Thornton, R. I.*

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Fine French-Spun Worsted and Worsted Merino Yarns

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Attractive Quotations on Commission Business

Single
Multiple
Plain Twists
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Dyed or Natural

PFINGST YARNS
MADE BY A KNITTER FOR KNITTERS

Rayon for Spot Shipment

150 Denier Rayon on Cones
150 Denier Rayon and 1, 2 or 3 ends Japan Silk on Cones
80 Denier Cones or twisted with 1, 2 or 3 ends Japan Silk on Cones
150 Denier Twisted with 50/1 Worsted on Cones
Two Ply Mercerized Yarns twisted with 1, 2 or 3 ends Japan Silk
Japan Silk on Cones, 2 to 12 Thread Inclusive.

GEO. B. PFINGST, Inc.,
302 Chestnut St., - Phila., Pa.

Silk, Rayon, Rayon and Silk

AUTOMATIC LOOMS

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at MILFORD, MASS.

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C. O. DRAPER, *Vice-President*
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FRENCH SPUN YARNS
FOR KNITTING AND WEAVING

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THOMAS H. BALL, *Selling Agent*
PHILADELPHIA PROVIDENCE BOSTON NEW YORK MILWAUKEE CLEVELAND

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JAMES DOAK JR. COMPANY
WORSTED SPINNERS
KENSINGTON PHILADELPHIA

RAYON AND SILK YARNS

Rise in Raw Silk Helps Rayon Market

Increased Demand is Reported from Broadsilk and Hosiery Manufacturers

Though it is an open question whether rayon needs any help at the present time, the recent rise in raw silk prices has reacted to the benefit of producers if reports from sellers are correct. The situation in the 150 denier yarns is already acute and is becoming more acute daily due to the requests of broadsilk and hosiery mills. Sellers state that in the last week or two an additional and unexpected interest has been shown by broadsilk mills. In many cases concerns that heretofore have never used rayon have requested sample lots to try out. Whether these will achieve entirely happy results with a fibre that they do not know how to handle is a question but it has shown that there is a relation between raw silk prices and rayon consumption.

The price situation continues practically unchanged. Dealers state that the 150 denier bring premiums of between 10c and 20c a lb. without any difficulty for spot merchandise. Other sizes rule about the same as producers' prices with no surplus in any size. It would seem that producers are endeavoring to ease up the shortage in the 150s by taking away from the 300s. There is no stock to speak of in the latter as there was for a time this spring. Some of the finer deniers which are of particular interest to the broadsilk mills are understood to be getting rather scarce but no premiums have been heard as yet.

Prices for the last quarter, as based on the product of the Viscose Co., Tubize Artificial Silk Co. of America, du Pont Rayon Co. and Industrial Fibre Corp. of America, are as follows:

Denier	"A"	"B"	"C"
50	$3 50	....	....
60	3 40	$3 15	$2 50
70	3 25	3 05	2 50
75	3 10	2 90	2 70
80	3 10	2 90	2 40
90	3 00	2 80	2 40
100	2 90	2 70	2 50
120	2 45	2 30	2 10
130	2 25	2 10	1 90
140	2 15	2 00	1 85
150	2 00	1 90	1 86
160	2 00	1 90	....
170	1 90	1 80	....
180	1 90	1 80	....
200	1 90	1 80	1 70
300	1 75	1 65	1 55
450	1 75	1 60	1 45

Prices on Celanese, made by the American Cellulose & Chemical Mfg. Co. are as follows:

45	$5 00
75	3 75
100	3 65
*120	3 50
150	2 90
*170	2 85
200	2 75
*250	2 70
300	2 70

* Imported.

Combination yarn prices are as follows:

80 Denier Cellulose	
3 ends 13/15 double extra A raw silk	$4 85
4 ends 13/15 double extra A raw silk	5 05
5 ends 13/15 double extra A raw silk	5 20
150 Denier Cellulose	
1 end 13/15 double extra A raw silk	3 10
2 ends 13/15 double extra A raw silk	3 45
3 ends 13/15 double extra A raw silk	3 65

Rayon Notes

Industrial Rayon Corp. Personnel

The following have been announced as officers of the Industrial Rayon Corp., recently organized to acquire the Italian interests in the Industrial Fibre Corp. of America: Walter W. Birge, president; Samuel Underleider, 1st vice-president; C. H. Dimick, 2nd vice-president; Paul Wrigley, secretary; D. S. Mallory, treasurer.

* * *

Ground Broken for Bemberg Plant

Ground was broken this week for the actual construction of the first building of the American Bemberg Corp. plant to be located in Happy Valley, between Johnson City and Elizabethton, Tenn. R. J. H. Worster of Lockwood, Greene & Co., engineers, is in charge of the construction of the entire plant, according to the announcement.

* * *

Courtaulds Canadian Plant Completed

CORNWALL, ONT.—According to reports the new artificial silk plant of Courtaulds, Ltd., here is now completed and it is expected that operations will begin shortly. The new industry will employ about 500 people and it is estimated that the first unit of the plant will have an average production of 25,000 pounds weekly or over 1,000,000 pounds annually. This is of great significance in Canada's business progress as it marks the inauguration of the rayon manufacture in Canada. The strides made by this new textile industry have been remarkable, but sensational developments still lie in the future, according to well-informed factors in the Canadian textile field.

* * *

Further Rumors of Rayon Manufacture by Dominion Textile Co.

MONTREAL, QUE.—Various stories and rumors to the effect that the Dominion Textile Co. has definitely purchased certain patent rights in connection with the manufacture of rayon and that the company has decided to proceed with its manufacture have been current. Sir Charles Gordon, president of the company, says that this was not the case, and that nothing has been decided as yet in

Manufacturers of
HOSIERY TRAM

Artificial Silk on Cones

Artificial Silk twisted with Raw Silk

Artificial Silk twisted with Worsted

Artificial Silk twisted with Cotton

Mercerized Cotton twisted with Raw Silk

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PHILADELPHIA

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Boston Representatives:
Perkins & Boland, Inc., 80 Federal St., Boston
Southern Representative:
French Campbell, Jr., 316 James Bldg., Chattanooga, Tenn.
Pennsylvania Representative:
H. L. Nattress, 550 McKnight St., Reading, Pa.
Western Representative:
Campbell & Van O'Linda, Utica, N. Y.

MARCUS FRIEDER, President

General Silk Importing Co. Inc.

YOKOHAMA SHANGHAI SHAMEEN, CANTON MILAN LYONS

Raw, Thrown, Spun and Dyed Silks, Hosiery Tram, Insulating Silk

Prepared in any Standard Form of Package

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National Spun Silk Company
INCORPORATED

MILLS: NEW BEDFORD, MASS.

High-grade Spun Silk Yarns for all Purposes

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Klots Throwing Company
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Silk Throwsters

MILLS:

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Combine Du Pont Rayon with silk, and a new fabric springs into being—such as the beautiful Rayon-silk creation illustrated. You will find a ready market for a material of such novel loveliness.

With a unique border of Du Pont Rayon—

BROAD SILKS enter into new fields of development, now that they can be enhanced by the rich tone qualities of Du Pont Rayon.

Emulating style creators who go to the corners of the earth seeking new motifs, you, too, can share in the creation of the artistic by interpreting your *own* ideas with Du Pont Rayon.

With its distinctive characteristics, Rayon adds something of beauty to silk—a soft brilliance whose delicacy women appreciate. By using it to create new fabrics, you are taking the surest road toward building new business.

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BUFFALO, N. Y.

Branch Sales Offices:

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31 North Sixth Street, Reading, Pa.
Old Hickory, Davidson County, Tenn.
569 Mission Street, San Francisco, Cal.
408 Woodside Building, Greenville, S. C.

Canadian Agents:
WM. B. STEWART & SONS
64 Wellington Street, W., Toronto

DUPONT RAYON

Du Pont RAYON, *with textile virtues all its own, bows to no other material. For in* RAYON, *a new composite is expressed—lustre and softness combined with strength and filling qualities. Thus in* RAYON *is found the economy that conservation demands.*

Rayon and Silk Yarns—Continued

this connection. In the meantime, the company is still investigating along these lines. It is expected, though, that the company will go into the new line.

Spun Silk Firm

Market is Quiet but Prices Hold at Peak

Sales were few and far between in the spun silk market last week, but this condition was entirely due to the fact that the larger producers have practically nothing to sell over the balance of the year. Prices were firm at the high levels recently reached and there was no disposition to shade them. As a matter of fact it is a question whether sellers would care to commit themselves to any large extent further ahead than at the present with waste as scarce and high as it is. Some business has been reported placed for 1926. Schappe quotations have shared the strength of spun silk and are now at the highest point in several years. Prices are as follows:

60—2	$6.60	30—2	$5.70
50—2	6.35	20—2	5.35
40—2	6.00	60—1	5.10

Thrown Silk Steady

Market Quieter as Manufacturers Hold Off Buying

The thrown silk market had a somewhat easier tone last week, prices being shaded up to 10c a pound by the close. Many dealers are sold up a month to two months in advance, but by the same taken mills are covered on these deliveries. Demand for two-thread and three-thread georgette was noted, but these constructions were difficult to buy and full prices were being asked. Heavier crepe yarns, organzine, and tram were rather quiet with buyers holding off in the hopes of a reaction in raw silk that will let them come in the market at a lower level. As noted above sellers could take all the two and three thread contracts they wished to but as they cannot find spindles to turn out the work they are unable to sell. Prices are as follows:

(60 days basis)

Japan Organzine 2 thd Crack XX in skeins	$8.25
Japan Tram 3 & 4 thd in skeins	7.45
Japan Tram 5 thd on cones	7.35
Japan Crepe 3 thd on bobbins 65 turns	8.15
Japan Crepe 2 thd Crack XX on bobbins 70 turns	8.90
Canton Crepe N S 14/16 3 thd on bobbins	7.50

Silk Yarn Note

Yarn Representatives Appointed

Van Straaten & Havey, Inc., 137 Berkley Street, Wayne Junction, Philadelphia, manufacturers of hosiery tram and all classes of combination yarns, announce that they have completed arrangements whereby Campbell & Van Olinda, yarn brokers, Utica, N. Y., will represent them in Pennsylvania, southern and western territories. The Pennsylvania territory will be taken care of by H. L. Nattress, 550 McKnight Street, Reading, Pa.; the southern territory by French Campbell, Jr., 316 James Building, Chattanooga, Tenn., and the western territory by Mr. Van Olinda, with headquarters in the main office, Utica, N. Y. In addition to this representation, Van Straaten & Havey, Inc., have headquarters at 389 Fifth Avenue, New York City, in charge of A. Rosenstrauch, who covers New York City, New York, and New Jersey. The eastern district is covered by Perkins & Boland, Inc., 80 Federal Street, Boston, Mass.

Great Variety of Women's Wear Fabrics This Fall

A special bulletin issued by the Fashion Service Department of the Botany Worsted Mills, states in part:

"With the conclusion of the August openings in Paris the American field settles down to a final revelation of the full resources of the mode for fall and winter. Palm Beach is now within the possibilities of reasonably accurate forecasting. Much that is gratifyingly fresh in conception has enriched the silhouette developments. A wider color range than the winter charts usually afford has been generously unfolded. Last, but by no means least, the fabric decisions present a gratifying range from severest men's wear fabrics for both town wear and sports usage, to college and business dress, through richly varied softly pliable cloths for formal wear, to an exotic and glamorous beauty in evening dress of surpassing splendor. From highest authorities, the verdict is rendered that a more animating, interesting and artistic demonstration of fashion themes has been advanced than in any previous season. . . . The range of fabrics employed for suit developments is wide and includes napped suitings, reps, cashmeres, broadcloths, cheviots, coverts, men's wear fabrics, diagonals, basket weaves, velvets and velveteens. Included in the fabric developments for dresses are reps, cashmeres, ottomans, wool crepes, coverts, broadcloths, various fine novelties combining wool and rayon, heavy silk crepes, satins, velvets and velveteens. Snake skin and peltry-print velvets are important last words from Paris, as are the elaborated metal fabrics."

AMSTERDAM, N. Y. J. R. Kenworthy, formerly with the W. B. Charles Co., Amsterdam, N. Y., has organized a selling organization which will deal in silk and rayon fabrics. The company will do business under the name of the John R. Kenworthy Co. and the main offices will be at Amsterdam.

RAYON

(Artificial Silk)

Fast Dyed Sized

In fast Colors, Indanthrene. Colors fast to Chrome Cross Dyeing, Fulling, Scouring and Crabbing. Also direct. Skeins, Dresser Spools, Jack Spools and Quills.

All merchandise Dyed and Converted on our own Premises.

Fast and Direct Color Work in Single and Ply Silk for the Following Trades:

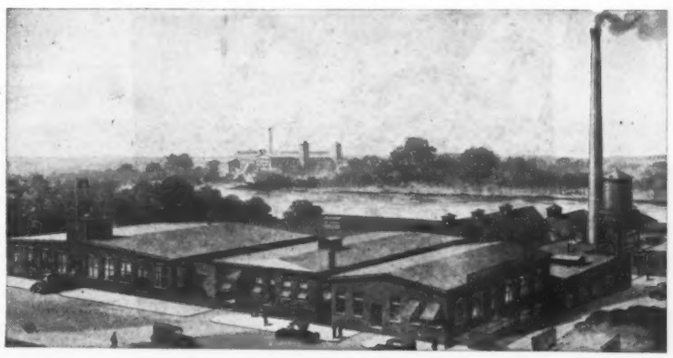
Woolens and Worsteds
Cotton Goods
Electric Wire
Knit Goods

Special Colors Dyed to order for prompt Delivery. Color Card on application.

ROBISON RAYON CO., INC.

Successors to
ROBISON-LINDNER CO., INC.
20 West 22nd St., New York

Sales Representatives:
Clinton V. S. Remington, Fall River—Mass.
Heineman & Seideman, Inc., New Bedford—Providence.



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of

Yarns, Tops, Raw Stock and Piece Goods

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Founded by Mark Hough in 1884

ENTERPRISE DYE WORKS, Inc.
Woonsocket, R. I.

Mr. I. Kno-Wool says: *"'Wool-gathering' is the most costly process in the Woolen—or any other Business."*

Concentration of Thought and Effort to please you, is our aim. May we have an opportunity ?

THE BASCH & GREENFIELD CO.

REWORKED WOOLS

Home Office and Mills Newark, N. J. | Established 1872 | Philadelphia 114 Chestnut St.

Philadelphia Wool Scouring and Carbonizing Co.

WOOL

Scoured and Carbonized

Freight Address: Coral St. Sta., P. & R. R. R. Somerset and Trenton Ave., Phila., Pa.

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WOOL AND COTTON

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Trial Samples Supplied Gratis

CLAREMONT WASTE MFG. CO., DEPT. W, CLAREMONT, N.H.

Reliable Humidifying Devices

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Process completed with one handling

A Real Bleaching System

Boil out in a machine with iron vat.

Bleach in a machine with concrete vat.

Wash, sour, soap and blue in machines with wood vats.

One operator does work of four to six men, and makes all transfers from one machine to another.

Any and all length skeins treated in same machine.

Yarn free from chlorine, a bleach second to none, and winding condition that cannot be surpassed.

For tapes, braids, laces, and skein yarn, all counts. Made any size desired.

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ALL SIZES FOR ALL PURPOSES

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ECONOMY BALER CO. DEPT. J. ANN ARBOR MICH. U.S.A.

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Twines, Threads and Yarns

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506 Market Street, Phila.

WOOL MARKETS

Foreign Auctions Help Boston Wools

Firmer Undertone to Summer Street—Quarter Bloods Come Back—Imports Gain 33%

BOSTON.—The Boston wool market is firmer this week and this is seen particularly in the higher prices paid for good domestic ¼ blood wools in the grease. Ohio high ¼ bloods are now held for 50c whereas these wools could be purchased, in small amounts at least, around 47c a couple of weeks ago. Three-eighths blood domestic wool is also much firmer. Demand from knitters is supposed to be the explanation of the comeback in price for these wools; tops grading 50s and 48s are already firm and in better call. The finer grades of wool show little change.

The undertone of the market is substantially firmer owing to strength in the Colonial and London markets. The September series opened in London Tuesday of this week. There was a large attendance with good competition, Germany and France buying freely. Prices on the whole were in favor of the seller. The best merinos were from par to 5% above closing prices of previous series. Medium crossbreds showed an advance of 2½%. Scoured merino lambs were 10% lower. There was no American buying on the first day but Bradford bought spottily. Withdrawals were small. Prices in Melbourne and Sydney also showed advances. At the Liverpool sale best white carpet and Kandahars were easier in price, all other qualities unchanged. No Jorias or Vicaneres were offered. Taking the foreign market as a whole it has tended to arrest the decline in Summer Street and sustain the opinion of those who look for firm and possibly higher levels for wool in the weeks to come.

Imports of wool into the United States for the year to date are much larger than in 1924, showing an approximate increase of 33%. Figures are now available showing that between Oct. 1, 1924 and to Aug. 31, 1925, the United States imported 39,800 bales of Argentine wool as compared with 29,200 bales similar period last year. In Uruguayan wools United States imports to date have totalled 26,200 bales as compared with 7,900 bales similar period last year. The largest importer of Argentine wools has been Germany with 57,500 bales this year and 79,000 bales last year; taking also 25,900 bales of M. V. wools this year as compared with 41,700 bales last year. German imports are therefore considerably smaller than last year. This seems to sustain the opinion of those who state that Germany, and France also, are short of wool.

In some English circles it is considered that in view of the fact that worsted manufacturing in the United States is getting on its feet, America will be a large buyer of merino and fine crossbreds in the Colonial markets and she will probably require a much larger amount than any time since the slump of 1920-21. Resumption of London sales is likely to prove an event of unusual interest. A number of American buyers are present and if Continental purchasing does not force prices too high there may be considerable buying for American account. The Bradford supply of medium and low crossbreds seems to be plentiful. Some of the larger Bradford firms will probably offer a portion of their stocks at the London sales now proceeding. This September series will offer the largest amount of wool for the last three years, some 225,000 bales, the previous largest offering being the September series of 1923, of 200,000 bales. These auctions are likely to prove a good test as to the real situation in the raw material market.

LONDON WOOL SALES OPEN STRONG

Bradford, Eng., Sept. 16 (Special Cable to TEXTILE WORLD).—London wool sales opened on Sept. 15 with good general competition and the French exceptionally large buyers. Withdrawals were small. All classes of crossbred wool firm at closing rates of July series. Best greasy merino was a shade dearer; other merinos unchanged.

Further reports on London sales indicate strong French competition for merinos and coarse crossbreds. Bradford buyers were quiet. Coarse crossbreds were often par to 5 per cent above July rates.

East Indian wool sales opened at Liverpool on Sept. 15. Whites were 5 per cent below July rates; other sorts unchanged.

Exports of Colonial wools to United States in August were 6,725,000 lbs., the largest since January. Exports of British wools were 2,313,000 lbs. largest since March.

Wool Receipts

Receipts of domestic and foreign wools at Boston, also imports at Philadelphia and New York for the week ended Sept. 12 with totals for year to date as compared with those of a similar period in 1924, based upon data compiled by the Market News Service of Bureau of Agricultural Economics, Department of Agriculture, are as follows, in pounds:

RECEIPTS AT BOSTON SINCE JAN. 1.

	Week Ended Sept. 12	1925	1924
Domestic	939,000	108,815,000	142,000,000
Foreign	1,686,000	129,579,000	85,950,000
Total	2,625,000	238,194,000	227,950,000
IMPORTS AT PRINCIPAL PORTS			
Boston	1,686,000	129,579,000	85,950,000
Philadelphia	620,000	68,204,000	47,567,000
New York	1,175,000	50,157,000	49,632,000
Total	3,481,000	247,930,000	182,949,000

Quotations

(Corrected at close of business on Wednesday)

Ohio, Pennsylvania and West Virginia

Fine delaine	.53—54
Fine clothing	.45—46
½ blood	—52
⅜ blood	—51
¼ blood	.49—50

Michigan and New York

Fine delaine	.52—53
Fine clothing	.43—44
½ blood	.50—51
⅜ blood	.49—50
¼ blood	.48—49

California
(Scoured Basis.)

Northern, 12 mo.	1.25—1.30
Sp'g middle counties	1.10—1.15
Southern, 12 mo.	1.05—1.10
Fall free	1.00—1.05
Fall defects	.90— .95
Carbonized	1.05—1.10

Texas
(Scoured Basis.)

Fine 12 mo.	1.30—1.35
Fine 8 mo.	1.15—1.20

Pulled—Eastern
(Scoured Basis.)

A.A.	1.20—1.25
A-Super	1.05—1.10
B-Lambs	.85— .93
B-Super	.90— .95
C-Super	.70— .75
C'bgs fine	1.10—1.15
Medium B	.90— .95
Medium C	.70— .80

Montana, Idaho and Wyoming
(Scoured Basis.)

Staple fine	1.25—1.30
Do. ½ bld.	1.12—1.15
Fine & fine medium clothing	1.20—1.25
⅝ blood	.95—1.00
¼ blood	.85— .90

Utah

Fine	1.25—1.30
Fine medium	1.20—1.25

Colorado, and New Mexico

Fine	1.25—1.30
½ blood	1.10—1.12
⅝ blood	.90— .95

Nevada
(Scoured Basis.)

Fine	1.25—1.30
Fine clothing	1.20—1.25

Mohair
Domestic

Best combing	.73—79
Best carding	.63—70

Foreign (In Bond)

Turkey Fair av.	.50—52
Cape Firsts	.42—43

Foreign Clothing and Combing
(In Bond.)

Scoured Basis—Cape (nominal):	
Super 12 months	1.12—1.18
Super 10-12 months	—
Australian:	
70s	1.25—1.30
64s	.98—1.02
58—60s	—
Grease Basis:	
Montevideo:	
58—60s	.43—45
56s	.40—41
50s	.38—39
Buenos Aires:	
44s	.29—31
40s	.26—28

Foreign—Carpet
(Grease Basis in bond)

Aleppo: Washed	.43—45
Angora:	.25—26
Awassi: Washed	.41—42
Karadi: Washed	.41—42
China: Combing	.34—35
No. 1 W'ld ball	.45—46
W'ld filling	.32—33
Szechuen ass't	.31—32
Cordova	.28—29
Khorassan: White, 1st clip	.34—35
2nd clip	.30—32
Mongolian: Urga	.41—42
Manchurian	.33—35
Black Face	.28—29
Servian skin wool	.31—32
East India: Kandahar	.42—43
Vickan'r	.45—50
Joria	.46—50

Medium Grades Selling

Fleece Wools Firmer—Softness Apparent in Pulled and Noils

PHILADELPHIA.—There is a better feeling in the market and a larger volume of wool has been sold this week although at unchanged prices. Dealers are more optimistic and those selling worsted mills report a better interest than for several weeks, admitting, however, they find it difficult to raise manufacturers' ideas, with the exception of quarter and three-eighths which are stronger on more active trading. Demand is running largely to medium grades and respectable sized sales are reported. There is a feeling in the trade there has been a quiet but steady demand, particularly in these grades, during recent weeks when the market was reported as being dull, this being probable in view of the way prices have held up in face of unfavorable reports. A more optimistic tone was given by early results of sales at London which indicated steadiness abroad.

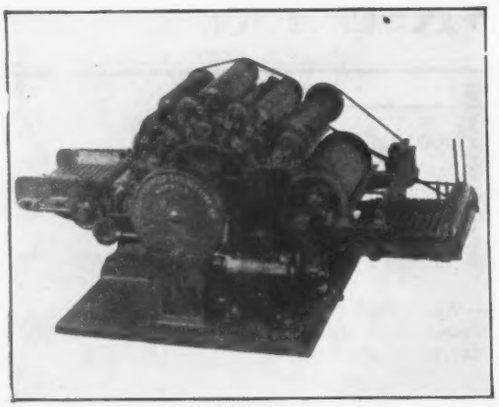
Quarter Bloods Firm

Average bright quarter blood is quoted at 47c to 48c, costing approximately 85c clean while choice lots have sold at 49c. Dealers in Ohio wools are holding at 50c and have refused offers a half cent lower this week. A consignor refused a similar offer for his quarter blood New York wool. Three-eighths is also in fair request and steady, dealers holding this grade at 52c while others will take a cent less. A large lot of bright quarter and three-eighths was moved at 50c; 150,000 lbs. of bright quarter was sold at 47c to 48c, while others sold medium sized lots of Ohio fine clothing at 46c; Ohio quarter at 49c; fine delaine at 53c and a large lot of semi-bright quarter and three-eighths was sold at private terms.

B Supers Lower

Worsted interest is expanding and fair sized sales of territory are also

(*Continued on page 121*)



A Motor Driven Sampler

The hand card used for securing sample cardings was a primitive machine indeed. Today there is a more efficient—more dependable—method—it is the Sample Carder shown above.

Though small in size this machine has been constructed with extreme accuracy and precision.

We will be pleased to send you complete information.

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28-34 Davis St., Dept. T. HARRISON, N. J.

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TRADE MARK REG. U.S. PAT. OFF.
OILS AND GREASES

The chief engineer of a prominent Gas & Electric Company says:

"We have three 2000 K W Curtiss 3600 R P M Turbines and about 15 others from 25 to 100 K W. The 2000 K W runs 48 hours and is shut down 10 hours to clean the Condenser. In the spring 1922 we filled the system with Harris Special Turbine Oil and it was withdrawn in the spring of 1923 and filtered,—did not find over one quart of sludge in any engine. After filtering put same oil back and will filter it again this spring. Have added oil from time to time as needed."

You'll find Harris Turbine Oil to be the best you have ever used.

The A. W. Harris Oil Co.
Providence, R. I.

"AMERICA'S LEADING LUBRICANTS"
REG. U.S. PAT. OFF.

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Hand-Belt-Electric-Hydraulic

Baling — Presses

From year to year, hundreds of new names are added to the list of LOGEMANN baling-press users in the textile field.

Every year, repeat orders from users of LOGEMANN baling-presses increase steadily, denoting the satisfaction derived from this equipment.

But—

Until every mill-owner, superintendent, and operator, is familiar with the LOGEMANN line of balers for yarn, waste and finished goods, our advertising has not accomplished its purpose.

We solicit your inquiries.

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Winona St., off Shrewsbury St. Worcester, Mass.

RAGS, SUBSTITUTES AND WASTE

Slower Market Seen in Fibres and Rags

Mixed Woolen Rags High for Graders—Art Silk Wastes Meet Growing Interest

There is not much of a market in recovered wools at this time, if a market means the rise and fall of prices. The market is stationary at the moment and this statement covers quotations on standard processed fibres as well as the volume of new business being received for these products. The output of the reworked plants is on the decline and there is little in sight to lead to anticipative of any big change for the better in the near future. As the next heavyweight season draws near business will begin to appear and in the meanwhile the market and industry alike will play a waiting game.

The woolen rag market is a little stiffer, in sentiment at least, with softs around 14c. It is hardly necessary to state that this price is not altogether agreeable to the grader. Grading is at a low ebb in most plants. There is little in the situation to encourage this very necessary branch of the general industry. Materials are passing at moderately firm prices. There is a little trading going on, a little mill buying, but nothing in volume and little in sight at the moment to call for special comment. It would seem however that much better business will be seen later in the year when what is really a seasonal quietness has disappeared.

The wool waste market is irregular in demand and softer in price. It seems to be under the influence of the growing depression encountered in wools which have been sinking steadily for the last four or five weeks without however any actual break in prices. Fine white materials as might be expected are firm inasmuch as the demand is better than for the low grades. Some there are in this market who contend that fine worsted threads are much too high and that lower prices will have to be seen before there will be any large mill buying. This view is disputed by others who claim that around $1.00 per lb. is a rock-bottom price for fine white worsted threads.

Business in artificial silk wastes is on the increase. Rayon is a coming industry and its wastes will have to find larger outlets. It is difficult many times to distinguish the real character of the waste offered on the street by traders unless an actual examination of the material is made. Artificial silk wastes fall naturally into two main divisions; first, those wastes that come directly from actual manufacturers of rayon either from wood pulp or linter and secondly those wastes that come out of consuming mills, who buy tops and yarns for manufacturing processes and who as a result accumulate noils and thread wastes as by-products.

Quotations

(Corrected at close of business Wednesday)

Men's Wear Clips

Worsted—	
Dark	22—23
Light	32—33
Brown	25—26
Blue	34—36
Black	30—31

Women's Wear Clips

Serges—	
White	63—64
Blue	32—33
Black	28—29
Brown	37—38
Green	35—36
Light	37—38
Tan	42—43

Old Woolen Rags

Merinos—	
Coarse light	12½—13
Fine light	27 —28½
Fine dark	8 — 8½
Serges—	
Light	14½—15
Brown	16 —17
Blue	16 —17
Black	10 —10½
Red	20 —21
Green	17 —18
Knit—	
White	46 —47
Black	21 —22
Red	28 —29
Brown	19 —20

Skirted Worsted

Light	10½—11
Black	9 — 9½
Blue	8½— 9
Dark	5½— 6

Wool Waste

Lap—	
Fine White	$1.33—$1.35
Fine Colored	1.08— 1.10
Medium Colored	.55— .60
Ring—	
Fine Australian	1.30— 1.32
Fine Domestic	1.25— 1.28
Thread White Worsted—	
Fine	1.05— 1.07
½ Blood	.85— .90
⅜ Blood	.75— .80
¼ Blood	.55— .60
Low	.45— .48
Thread Colored Worsted—	
Fine	.43— .45
½ Blood	.39— .41
⅜ Blood	.30— .35
¼ Blood	.29— .32
Low	.27— .28
Carpet	.21— .23
Card—	
Fine White	.62— .65
Medium White	.45— .50
Fine Colored	.20— .22
Medium Colored	.10— .12

Reworked Wool

	Cents per lb.
Serges—	
Blue	29—30
Brown	28—30
Green	29—31
Red	32—33
Black	24—25
Knits—	
White	70—75
Red	43—44
Brown	36—38
Merinos—	
Fine light	37—39
Fine dark	18—20
Coarse light	24—25
Worsted Skirted—	
Light	23—24
Blue	21—22
Dark	17—18
Brown	20—21

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HYDRO EXTRACTOR

FOR ALL BRANCHES OF THE TEXTILE INDUSTRY

These machines are unquestionably the most solid and substantially constructed extractors on the market

Electrically driven type No. 4

Write for Catalogues Showing our various types of machines arranged to be driven by Steam, Belt, Electricity or Water Power.

Free access all around the Machine—Smooth and Silent Running—"Cottonfield Brand" English Roller Leather—Tomlinsons Wiping Waste Machinery—Threlfall's Self-Acting Mules—Greenhalgh Willows.

Sole Agents in U. S. A.

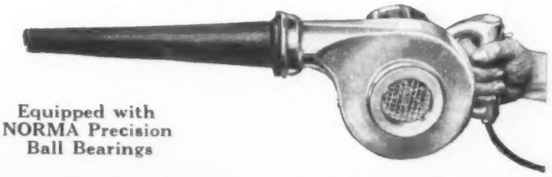
T. V. COTTER & SONS

179 Lincoln St. Boston, Mass.

Southern Representative: John Hill, Healey Bldg., Atlanta, Ga.

Test This NEW Bigger Blower

in your own plant before you buy



Equipped with NORMA Precision Ball Bearings

Cleaning out a fly-shuttle loom with a Cadillac.

Removing lint and dust from a knitting machine with a Cadillac.

The New BALL BEARING

CADILLAC

Portable Electric

BLOWER

Model G

is designed specially to clean large looms and other textile machinery where lint accumulates.

It will also blow the dust quickly and thoroughly out of motors, switchboards, etc., preventing "shorts" and "burn outs," and reducing fire risk.

Instantly convertible for suction cleaning

According to Armour Institute tests, the CADILLAC Model G produces a pressure of 21½ inches of water, easily the strongest of any machine of this type. Write today for information regarding this latest improvement in industrial cleaning machinery.

CLEMENTS MFG. CO.

607 Fulton Street, Chicago

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WYANDOTTE TEXTILE ALKALIES

is due to the fact that they do the things for which they are recommended; that they do them better than they were ever done before; and that they do them at a cost that nets a profit to their users. What is being done for others will be repeated for you.

Write for further information or order from your supply house.

The J. B. Ford Company
Sole Manufacturers
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Textile Manufacturers

Should be interested in DIAX for the following reasons

FOR BLEACHING
Purer whites are obtained, less tendency to weaken fibres, saving of time and chemicals.

FOR DYEING
More level dyeings are obtained with economy of dyestuffs. Thorough degumming of previously dyed and finished goods are easily and cheaply performed.

FOR MERCERIZING
Has increased affinity of the cloth for the caustic liquor, gives better lustre, the mercerizing lye kept clearer and lasts longer.

FOR PRINTING
It is especially useful in making adhesive sizes and finishes, and less expensive, and is devoid of color and easily removable.

FOR FINISHING
Thin fluid mixing are produced which penetrate the cloth better, giving superior results in the handle and feel of the cloth, and economy in the use of starch and dextrine.
Further information gladly given. Write

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Laboratories: Brooklyn, N. Y.

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DECALSO
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LIME & SODA Softeners
FILTERS & PURIFIERS

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DYES FOR HEAVY FABRICS

WINTER weight Suit and Cloak Fabrics require colors that withstand exposure to sunlight and weather.

The National offers to dyers an extensive range of products applicable to raw stock, yarn, or piece-goods, and meeting all demands as to fastness requirements for such goods.

The National line of Ortho-Chrome and After-Chrome dyes will be found eminently suitable.

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ALIZARINES BEAVER SULPHUR COLORS
ECONOMY SERVICE

Announcement

The Beaver Chemical Corporation have just placed on the market a new color:

SULPHUR RED BROWN B C

It is absolutely a straight color. Excellent solubility and fast to light and washing. Especially adapted for machine dyeing.

Dunker & Perkins Co.
263 Summer St. Boston, Mass.

"LIGHT SOUR NO CHEMIC
YET A GREAT IMPROVEMENT OVER PREVIOUS RESULTS."

Report of a large Eastern Mill after Investigation.

You know the importance of these changes for the better! They increase the sales value of your goods. And you may have them too by adjusting your Kier Boil formula to include

SOL-ESCO

An alkaline detergent, incorporating the remarkable properties of minerals in the colloidal state.

Send for particulars now while you think of it

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Clean, Pure, Sparkling Water
NORWOOD ENGINEERING CO.
FLORENCE, MASS.
FILTERS

CHAPMAN ELECTRIC NEUTRALIZERS
Remove Static Electricity from all Fabrics
Factory, Portland, Me.
M. S. PENNELL
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127 Federal St.
Boston, Mass.

DYESTUFFS AND CHEMICALS

Chemical Market Holds Quite Steady

Some Commodities Like Sulphuric Acid Below Pre-War Basis—Alkalis Very Firm

Industrial chemicals following the precipitous decline in prices which began about the middle of the second quarter of 1923 and reached its low point at the beginning of the third quarter of 1924 have been since that time undergoing a very steady process of stabilization. For the past year and a half there has been practically nothing except moderate fluctuations governed by usual market operations. Not a few standard materials are actually on pre-war level some are lower, notably sulphuric acid which is quoted $14–$15 per ton as against $19–$20 per ton in 1914. Bleaching powder is only 40c per 100 lbs. above pre-war prices. Sulphurate of copper, sodium prussiate and not a few other chemicals are lower than in 1914. Caustic soda and soda ash on the other hand are substantially higher.

The market has been more active during the past week and the export situation is encouraging. The index figure is up fractionally for the week in spite of slight declines in the prussiates of potash and the compounds of tin. Chlorine is in steady demand and bleaching powder is moving more freely on contract. Prices are firmly maintained on both bleaches. In soda ash a good business is being done both for home consumption and export. Prices for the various qualities as well as on kinds of packing are unchanged. Exports for July amounted to 3,760,000 lbs. as compared with 2,144,000 lbs. in July, 1924. The caustic soda market is very steady with larger deliveries being taken, particularly by soap makers.

In general chemicals zinc chloride is fairly active, the granular being quoted 7-8½c with the fused 1c per pound lower. Soda sulphide is in better demand the 60 per cent solid being quoted $3.75-$4.00 per hundred. The nitrities hydrosulphites and bisulphites of soda are unchanged in price and seem in routine textile demand. Mineral acids are on a firm basis. Leading producers of sulphuric and muriatic are well sold up. Nitric acid is moving rather slower. The organic acids as a whole are without any particular change.

WOONSOCKET, R. I. The Park Spring Dyeing & Bleaching Co. is said to be planning for the rebuilding of its plant recently destroyed by fire, with loss estimated in excess of $30,000, including machinery. The same fire also destroyed the mill of the Prue Knitting Co., and this company is also considering early replacement.

Miscellaneous Chemicals

Alumina Sulp. com.	1 40	—	1 45
Iron Free	2 00	—	2 05
Alum. Ammonia Lmp.	3½	—	3¾
Potash, Lump	2¾	—	3½
Ammoniac, Sal. white gr., dom.	7½	—	8
Bleach powder, per 100 lb. works, carloads	1 90	—	2 30
Blue Stone	4½	—	5
Calcium Arsenate	7	—	8
Chlorine, Liq. Cylinders	5½	—	8
Tanks	4	—	4¼
Copperas, ton	12 00	—18	00
Cream of Tartar	21½	—	22½
Epsom Salts, 100 lb.	1 30	—	2 00
Formaldehyde Spot	9	—	9½
Glauber Salts, 100 lb.	85	—	1 50
Glycerine (C.P.) bbls.	19	—	19½
Cans	20	—	20½
Yellow Crude	17½	—	18
Hydrosulphite Conc.	24	—	25½
Lead—Brown acetate	13½	—	14
White (crystals)	14½	—	15
Lime, acetate, 100 lb.	2 75	—	...
Potassium—Bichromate	8½	—	8¾
Chlorate crystals	8½	—	9½
Permangan, tech.	14½	—	16
Sodium acetate	4½	—	5
Bichromate	6½	—	6¾
Bisulphite, 35%	1 40	—	1 50
Nitrite	8½	—	9½
Phosphate	3¼	—	3¾
Prussiate yellow	10½	—	10¾
Sulphide, 60% fused	3¾	—	4
30% crystals	2¾	—	3
Tartar emetic, tech.	28	—	31
Tin—Crystals	40½	—	41
Bichloride, 50 deg.	16½	—	16¾
Oxide, bbls.	62	—	64
Zinc Dust	10	—	10½

Acids

Acetic, 28% per 100 lb.	3 00	—	3 25
Citric crystals	45½	—	...
Formic, 90%	10½	—	11
Lactic, 22%	6	—	7
Muriatic, 18 deg. per 100 lb. in tank cars	80	—	90
Nitric, 36@42 deg. per 100 lb	4 50	—	6 25
Oxalic	10¾	—	11½
Sulphuric, 66 deg. per ton in tank cars	14 00	—15	00
Tartaric	29	—	...

Alkalies

Ammonia, aqua, 26 deg	6½	—	...
Borax, Crys. bbls.	5	—	6
Potash, carbonate, 80–85%	6	—	6½
Caustic, 88.92%	7¼	—	7¾
Soda Ash, 58% light	1 43	—	2 44
Contract, 100 lb.	1 25	—	1 63
Bicarb, per 100 lbs.	1 90	—	2 25
Caustic, 76% per 100 lb.	3 20	—	3 90
Contract, 100 lb.	3 10	—	...
Sal. 100 lb.	1 10	—	1 25

Natural Dyes and Tannins

Fustic: Crystals	20	—	22
Liquid, 51 deg.	10	—	12
Gambier, liquid	13	—	14
Hematine, crystals	12	—	18
Hypernic Ext.—51 deg.	14	—	15
Indigo—Madras	1 15	—	1 25
Logwood Extract, liq. 51 deg	7	—	8
Crystals	16	—	18
Osage Orange, Extract, 51 deg.	7	—	7½
Osage Orange Crystals	14	—	14½
Quercitron extract, 51 deg.	6	—	7
Sumac. Ext. dom., ref., 51 deg	6½	—	7
Extract, stainless	9	—	10
Tannic Acid, tech.	35	—	40

Dyestuffs and Intermediaries

Alpha Naphthol, ref.	90	—	95
Crude	60	—	65
Alpha Naphylamine	35	—	37
Aniline Oil	17	—	17½
Salt	24	—	26
Beta Naphthol, sublimed	55	—	60
Technical	22	—	26
Dimethylaniline	32	—	34
Metaphenylene Diamine	85	—	90
Paranitraniline	58	—	62

Oils and Soaps

Castor Oil, No. 3	15½	—	17
Olive Oil, denatured, gal.	1 15	—	1 20
Foots	8½	—	...
Red Oil, lb.	10½	—	12
Stearic Acid, double pressed	14½	—	15
Turkey Red Oil, 50%	10	—	12

Adhesive and Sizing Materials

Albumen, blood domestic	50	—	60
Egg, technical	80	—	...
Dextrine-Potato	7¾	—	8¼
Corn, bags, 100 lb.	4 42	—	4 47
Do, bbls, 100 lb.	4 69	—	4 74
Gum, British, 100 lb.	4 72	—	...
Do. bbls	4 99	—	...
Sago flour	3½	—	4
Starch, corn, 100 lb.	3 67	—	3 77
Do, bbls.	3 94	—	4 04
Do thin boiling, bags, 100 lb.	4 27	—	4 37
Do, bbls.	4 54	—	4 64
Potato	6	—	6½
Rice	9½	—	10½
Wheat	6½	—	7
Tapioca flour	3½	—	6

Coal Tar Dyes

Direct Colors—			
Black (H-acid)	28	—	35
Black Columbia FF.	50	—	60
Blue, 2 B.	24	—	32
Blue, sky ordinary	60	—	80
Blue, 1 GL	2 00	—	2 50
Blue, 4 GL	1 25	—	2 00
Blue sky, FF	95	—	1 50
Blue, Fast, RL	1 90	—	...
Blue, Solamine	2 00	—	...
Benzo Azurine	75	—	80
Brown, C	40	—	60
Brown, M	70	—	90
Brown, Congo G	85	—	...
Brown, Congo R	80	—	...
Green, B	75	—	90
Green, G	1 00	—	1 05
Orange, Congo	60	—	...
Orange, Fast S	1 85	—	...
Red Fast F	90	—	1 00
Red, Congo	40	—	50
Benzo Purpurine 4 B.	40	—	60
Benzo Purpurine 10 B.	1 25	—	1 50
Scarlet, 4 BA	1 50	—	...
Scarlet, 4 BS	2 10	—	...
Scarlet 8 BS	2 15	—	...
Scarlet, Diamine B.	1 65	—	...
Violet N	1 10	—	1 20
Yellow, Chrysophenine	60	—	1 80
Yellow, Stilbene	90	—	95
Developing Colors—			
Black, B. H	60	—	90
Black Zambesi	1 15	—	...
Bordeaux, Dev	2 50	—	...
Orange, developed	2 50	—	...
Primuline	1 00	—	1 15
Red, Dev. 7 BL	2 50	—	...
Scarlet, Dev	2 50	—	...
Sulphur Colors—			
Black	18	—	30
Blue, cadet	80	—	95
Blue, navy	50	—	60
Brown	20	—	60
Green	55	—	1 50
Green, olive	25	—	50
Yellow	45	—	50
Basic Colors—			
Auramine	96	—	1 60
Bismarck Brown	50	—	60
Chrysoidine	40	—	65
Fuschine crystals	1 50	—	1 75
Malachite green	1 70	—	...
Methylene blue	1 25	—	1 40
Methyl violet	80	—	1 15
Rhodamine B, extone	5 50	—	6 00
Safranine	1 45	—	1 60
Victoria Blue B	3 25	—	4 00
Acid Colors—			
Naphthol blue blk	40	—	70
Naphth lamine black 4 B	50	—	55
Alizarine saphirol	2 75	—	4 00
Alkali blue	3 25	—	3 50
Indigotine	75	—	1 80
Induline (water soluble)	75	—	80
Soluble Blue	3 00	—	3 75
Sulphoncyanine	70	—	95
Sulphone Blue R	80	—	95
Patent Blue A	2 85	—	...
Resorcin brown	80	—	90
Guinea green	1 00	—	2 20
Wool green S	70	—	1 70
Orange II	24	—	30
Orange GG crys	60	—	...
Acid Fuchsine	80	—	90
Azo eosine G	65	—	82
Crocein scarlet	1 15	—	1 30
Fast red A	75	—	80
Azo yellow	1 35	—	1 40
F. Light Yellow 2 G.	2 00	—	...
F. Light Yellow 2 G.	3 00	—	3 25
Naphthol, yellow	1 35	—	1 40
Chrome Colors—			
Aliz. Black B	1 50	—	...
Diamine Black PV	70	—	...
Chrome Blue Black	48	—	54
Chrome Brown	60	—	1 25
Chrome Green	75	—	1 50
Chrome Yellow	45	—	1 10
Indigo—			
Synthetic 20% paste	15	—	15½
Contracts	14	—	14½

Coal Tar Dyes Steady to Firm

Production in 1924 Declines 27%, But Vat Dye Manufacture Increases

Coal tar products are moving on a steady to firm market which seems to suggest a more favorable situation for larger merchandising in the not distant future. The movement of crudes is good while intermediates are encountering more inquiries although little expansion of business is noticeable. During the past week the only price movements of importance cover an advance of 2c a lb. in diethylaniline and a decline of 5c a lb. in anthraquinone. The general index figure covering a number of products is practically unchanged for the week and month.

The United States tariff commission will shortly issue a full report on the dye and synthetic organic chemical industry. The total production of coal tar dyes by 78 firms in 1924 was 68,679,000 lbs., a 27% decline from the maximum output in 1923 of 93,667,000 lbs. This reduction it is said is due principally to decreased activity in the domestic textile industry. Dyes of domestic manufacture now provided about 95% of U. S. consumption. Production of vat dyes other than indigo showed an increase in 1924, the total being 1,821,000 lbs. as compared with 1,766,000 lbs. in 1923. Vat dyes, including indigo constitute approximately 32% of the domestic output. The average price of all dyes sold in 1924 was 54c per lb., a 2% decline from that of 1923. In 1920 the average price was $1.08 and in 1917 $1.26 per lb. Imports and exports for 1924 were both smaller than previous years, the exports showing a 12% decrease. From Germany came 50% of imports, 30% from Switzerland and the balance scattering. Vat dyes comprised nearly 50% of all dyes imported.

Notable progress was made in the manufacture of more than 60 dyes of high fastness during 1924.

Over $2,000,000 was expended for research in 1924 or a full total of $25,000,000 for the period 1917–1924. The reduction in the tariff, effective September 22, 1924, led to a rapid increase in the monthly imports. The average monthly import of dyes from October, 1924, to July, 1925, inclusive was 459,000 lbs., an increase of 156% above the monthly average of the first nine months of 1924 preceding the tariff reduction on dyes.

The report further draws attention to the fact that since 1914 the world capacity to produce dyes has nearly doubled and an era of competition has set in which promises to eliminate

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A chemist in a New England dye house—one of the largest in the country—tells us that he finds D-SIZ-O 25% stronger than the material he had been using.

And yet D-SIZ-O costs no more. The result is a very material saving. Write for quotations and sample. Make comparisons. We are satisfied to leave the decision to your own good judgment.

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"THE 250° DIASTATIC MALT"

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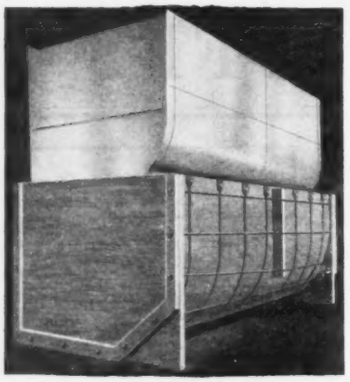
Dyestuffs

252 Congress Street Boston, Mass.



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1309 Chestnut St.,
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Monel, Copper, Bronze and Lead Lined Tanks
Monel Metal Lined Paddle Type, Dyeing Machines.

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Drying Systems for Straight Away Tenters.
Drying Systems for Return Tenters.
Drying Systems for Dry Cans.
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Vapor Absorption Systems for Dyehouses and Bleacheries.
Hosiery Dryers

Sturtevant also remodels stock dryers, and endeavors to give to the Textile Industry a complete drying service. One of our industrial drying engineers will gladly call and talk over your drying problem with you.

Sturtevant PUTS AIR TO WORK

B. F. STURTEVANT CO.
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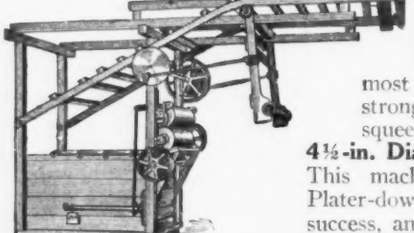
THE RELIANCE WARP DYEING MACHINE



Special attention is called to this improved **Warp Dyeing Machine.** This machine is built in the most substantial manner, being strongly geared with good, heavy squeeze rolls, and having **Seven 4½-in. Diameter Brass Rolls.** This machine, with our improved Plater-down has met with marvelous success, and parties desiring machinery of this class can make no mistake on ours. For further particulars and prices, address

RELIANCE MACHINE WORKS
Hedge and Plum Streets, Frankford, Phila.

Roberts Filters

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Provide Pure Clean Water for All Industrial Purposes

We manufacture pressure and gravity filters especially adapted to meet the exacting needs of the textile industry—

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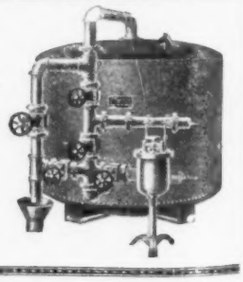

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And for Bleachers, Dyers and Finishers
Engraving Machinery and Supplies
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Branch Office: 15 Pine Street, Providence, R. I.

Dyestuffs and Chemicals—Continued

many of the existing plants. Germans and Swiss have an advantage in the consolidation of the companies not possessed by any other country. Such a consolidation in the United States would be in violation of anti-trust laws.

Dye & Chemical Notes

Sandoz Announces New Direct Fast Cyanines

In response to the demand for cheap direct blue of better fastness, Sandoz Chemical Works, Inc., have brought out three Direct Fast Cyanines. Their announcement states: "These new Sandoz cyanines are less expensive and are of much better fastness to washing than the ordinary type of Direct Blues 2B and 3B, etc. The products are discharged white with Hydrosulphite and are of good fastness to acids and alkalis."

* * *

Grasselli Chooses Charlotte as Southern Distribution Point

CHARLOTTE, N. C.—The Grasselli Chemical Corp., has chosen Charlotte as its distribution point for southeastern States. The Union Storage and Warehouse Co. will erect for the chemical firm a large office and warehouse building on West Morehead street at a cost between $150,000 and $200,000.

The Grasselli company has maintained a branch office here to serve mills and jobbers in the Carolinas but will expand its business to take in the entire Southeast. It is expected that the annual volume of business through the Charlotte office will exceed $1,000,000. J. S. Tremoulet, district sales manager for the Birmingham district and C. M. Woolfolk, who will probably be manager of the Charlotte office, completed arrangements for the lease of the building.

* * *

New Orange Useful on Rayon Mixtures

E. I. du Pont de Nemours & Co. have placed on the market an entirely new product designated as Pontamine Fast Orange 2G Conc. The announcement states: "This product is a direct color which possesses not only good fastness, but very good working qualities, and therefore finds a wide use as it can be used on all types of circulating machines, as well as on a padder and for cotton in any stage of manufacture when the best types of direct colors are required. It possesses very good fastness to acids and perspiration,— good resistance to water, washing and alkalies. It has two very important additional properties: One is its ability to discharge easily to a clear white with Sulfoxite C on both cotton and silk, and the other is that it does not change in shade or properties when diazotized and developed. This latter characteristic is possessed by but few direct colors. Pontamine Fast Orange 2G Conc. can be used on union of silk or rayon and leaves Celanese unstained."

* * *

Addition to Level Dyeing Acid Colors

Xylene Light Red 2GL is a new addition to the Sandoz Chemical Works range of level dyeing colors of excellent fastness to light. The announcement states: "It is especially suitable for self-shades or in combination with other fast to light level dyeing acid colors. We claim this color to be as fast to light as the class of Rubinols. On account of the good fastness to hot pressing, rubbing, perspiration, alkalis, washing and carbonizing, Xylene Light Red 2GL is recommended for the dyeing of ladies dress goods, upholstery, mohair, and drapery materials as well as carpet yarns and hats."

* * *

Discoloration on White Woolens when Dry Cleaned

WASHINGTON, D. C.—The cause of gray discoloration on white woolen fabrics in dry-cleaning has been discovered at the Bureau of Standards. The grayish hue of such garments after cleaning has caused considerable trouble in commercial dry-cleaning establishments. The problem was brought to the attention of the research associate of the National Association of Dyers & Cleaners stationed at the Bureau.

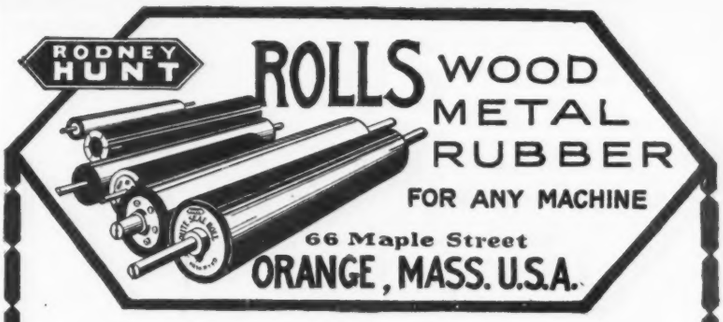
It was found that corrosion was caused by the electrolytic action produced when a benzine soap was introduced into the naphtha in the presence of zinc and iron which are used for lining the cleaning wheel. The sulphur and unsaturated hydrocarbon which occur as impurities in the naphtha combined with the metals freed in the electrolytic action to form sulphides, which in turn combined with the soap and oil to form a gray discoloration on the fabric. As the cause is inherent in present equipment it is recommended that new types of apparatus should be used and that these should be made or lined with some non-corrosive material.

* * *

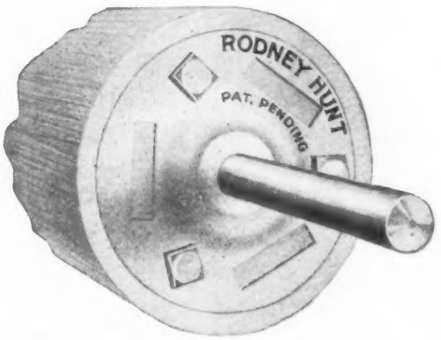
Want Ford Fertilizer Plant

GREENSBORO, N. C.—Strong efforts are being made in North Carolina to get Henry Ford to establish himself in the fertilizer business in the southern States, people of North Carolina having succeeded in getting the ear of the motor king and interesting him, his chemists and his traffic men, it appears. There is talk of factories at Norfolk, Wilmington, Charleston and Savannah, with perhaps others on the gulf ports. Cheaper fertilizer is the aim.

ATHENS, ALA. The plant of the Wellman Cotton Mill Co. here, which had been closed down for several weeks, is again in full operation.



Repeat Orders prove
GOOD VALUE
of these squeeze rolls



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From shade to shade with *speed*

The present day hosiery colors are extremely varied. Diversification is a necessity.

Changes from one color to another can be simply made with Strickland Paddle Type Dyeing Machines. Made of monel metal, these machines are quickly and thoroughly scoured. The efficient design provides for thorough penetration of the dye liquor. As a matter of fact, dyers have overloaded these machines as high as 100% and are "getting away with it"—excellently.

Further details will be gladly sent.

Strickland Paddle type Dyeing Machines
Strickland Sample lot Dyeing Machines
Strickland Bleaching Tanks

STRICKLAND
PATTERN WORKS
Chattanooga, Tennessee

What Part Ambition?

THE FACTORY manned by ambitious workers is where you will find machinery in the pink of condition, repairs negligible and production at the maximum. Under the urge of ambition, the worker keeps his tools fit, for he is using them for his own advancement. The ambitious worker has no common ground with the trouble maker.

AMBITION is a quality which predominates among the textile workers of COLUMBUS, Georgia. It is to be expected in a section where 99.4 per cent of the population are native born. It is inspired by outstanding examples; taught to the young in the textile department of the public school system; encouraged by the management of the mills, who know its value.

Some of the most prominent men of COLUMBUS, some of the highest factory executives, many of the successful business men, began their careers by being good mill workers. These examples inspire the individual effort which has given COLUMBUS mill workers the deserved repute of being exceptionally efficient and dependable as a class.

COLUMBUS has not had a textile failure in over half a century, nor a removal. All the big mills have grown from modest beginnings — and who can say what part the ambition of those who worked in them has had in their success?

These Essentials Mean Factory Profits

Dependable hydro-electric power	Absolute freedom from malaria
Reliable native-born labor	Pure drinking water supply
No labor disputes or strikes	Plenty of low rental houses
Big surplus supply of cotton	Efficient street transportation
Coal, iron and timber handy	Fine churches and schools
Rail and river transportation	Commission-manager government
Very low building costs	Friendly public sentiment
Pure, soft river water	Mild winters and summers

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New Industries Committee

of the Chamber of Commerce,

Postoffice Box 1220

COLUMBUS, GA.

Increase in Textile Imports

Larger Receipts of Raw Wool, Cotton and Silk During Last Fiscal Year—Foreign Purchases of Cotton Goods Decline

WASHINGTON, D. C.

IMPORTS of textile fibres and textiles were valued at $971,645,000 during the fiscal year ended June 30, a gain of $101,000,000 or 11.6% over the total for the previous 12 months, according to the Textile Division of the Department of Commerce. The bulk of this increase is accounted for by the larger volume of textile raw materials purchased abroad during the fiscal year ended at that time.

Heavy Imports of Fibres

Imports of raw wool during the 12 months ended June 30, aggregated 280,898,000 lbs. valued at $122,306,000 compared with 234,198,000 lbs. with a value of $75,420,000 entered during the preceding fiscal year. Carpet wool comprised approximately 50% of the total volume of wool imports in both these years, but receipts during 1925 exceeded those for the preceding year by more than 20,000,000 lbs. The greatest percentage of gain was recorded in imports of clothing wool which rose from 12,820,000 lbs. in the fiscal year, 1924, to 24,446,000 in 1925. Wool entered as combing wool amounted to 117,991,000 lbs. in the fiscal year, 1925, compared with 103,003,000 for the previous 12 months. China supplied 56,591,000 lbs. of the carpet wool imported in 1925 and 45,521,000 lbs. came from the United Kingdom, which also furnished 6,882,000 lbs. of clothing wool and 19,527,000 lbs. of combing wool. Australia was the principal source of the imports of combing wool, followed by the United Kingdom, Argentina, and Uruguay. Argentina supplied slightly over 30% of the imports of clothing wool, the United Kingdom being in second place.

New High Record for Raw Silk

Imports of raw silk during the fiscal year ended June 30, totaled 59,138,000 lbs. valued at $353,149,000—an increase of 28% in volume as compared with the previous 12 months, and the highest quantity ever entered into the United States during any year, either fiscal or calendar. Comparative figures for preceding fiscal years ended June 30, are as follows: 1924, 46,172,000 lbs.; 1923, 52,684,000; 1922, 48,179,000; 1921, 29,463,000. The average import price per pound was, 1925, $5.97; 1924, $7.58; 1923, $7.70; 1922, $6.24; 1921, $6.17.

The heavy imports of raw silk during the fiscal year, 1925, may be attributed to its comparatively low cost during this period and the popularity of silk for women's garments. During the calendar year, 1924, consumption of raw silk did not keep pace with imports and at the end of December, the stocks in warehouses amounted to 61,533 bales, the largest volume since the postwar period of inflation. By the end of June, however the stocks in warehouses had been reduced to 44,016 bales. Comparative figures for June, 1924, are 24,843 bales.

Notwithstanding that the United States production of rayon has mounted from 1,566,000 lbs. in the calendar year 1913 to 38,850,000 lbs. in 1924, and that the output for 1925 promises to equal and perhaps exceed the 1924 figure, the deliveries of raw silk to the mills increased from a monthly average of 28,346 bales for the fiscal year, 1924, to 36,641 for the 12 months ended June, 1925.

Inasmuch as mill deliveries afford a fairly accurate index of activity in the American silk industry, this seemingly would indicate that rayon is not supplanting silk to any large extent in the United States.

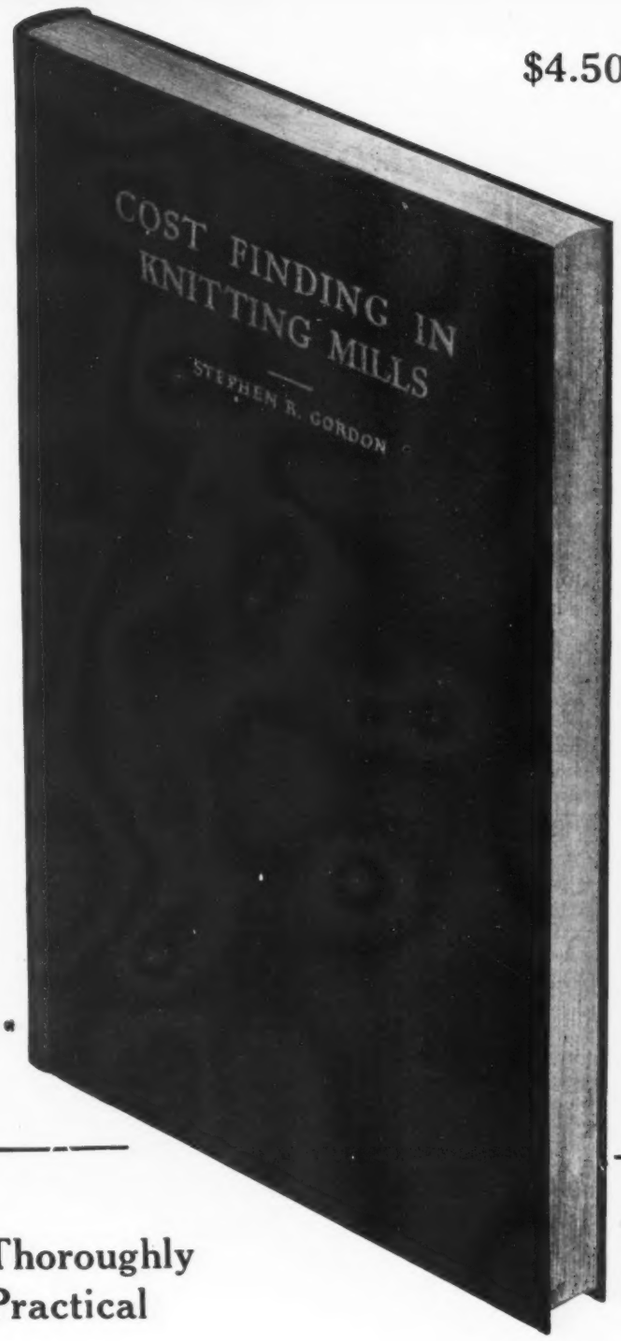
United States imports of raw cotton increased from 146,024,000 lbs. valued at $43,761,000 during the fiscal year, 1924, to 155,092,000 lbs. with a value of $50,640,000 for the 12 months ended June, 1925. Approximately one-third of the quantity entered in 1925 was classed as long-staple (1⅜ inches and over). The principal sources of the 1925 cotton imports were: Egypt, 91,930,000 lbs.; Mexico, 22,287,000; China, 15,942,000; British India, 13,044,000; Peru, 5,678,000.

Imports of jute and jute butts declined from 83,711 tons for the fiscal year, 1924, to 56,313 during the 12 months ended June, 1925, but the value increased from $8,587,821 to $9,407,765. The United States, however, imports the greater part of its jute requirements in the form of burlap, which ranks next to raw silk as the largest single item of import in point of value. The United States purchased 581,710,000 lbs. of burlaps valued at $72,572,000 during the fiscal year, 1925, compared with 602,801,000 lbs. with a value of $59,177,562 in the previous 12 months. During 1925, 510,087,000 lbs. of burlap valued at $61,948,000 were imported direct from British India.

American foreign purchases of other vegetable fibres amounted to 251,224 tons valued at $47,573,000 in the fiscal year, 1925, compared with 227,426 tons worth $31,820,000 for the preceding 12 months; the principal increase occurred in imports of sisal which rose from 96,969 tons with a value of $11,801,000 in 1924 to 145,981 tons valued at $23,023,000 in 1925. Receipts of manila declined from 98,032 tons in 1924 to 72,915, but the value was augmented by the higher price of this fibre in 1925, and rose from $13,525,000 in 1924 to $17,266,000 in 1925. In addition to these fibres, there were imported during the fiscal year, 1925, flax to the amount of 4,315 tons and 2,959 tons of hemp.

Decline in Cotton Manufactures

Imports of cotton manufactures during the fiscal year ended June 30



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Thoroughly Practical

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Using RAYON in Combination with Other Textile Fibres & Yarns

Many mill men are hungry for information on this comparatively new phase of textile manufacture. We therefore call attention to the following two books which are both timely and helpful.

Dress, Blouse and Costume Cloths—Roberts Beaumont and Walter George Hill.....$12.00

The authors interpret the commercial and industrial aspects of the trade; the nature, structure and qualities of the yarns employed; the weaving principles involved; the design and color schemes elaborated; and the systems of fabric construction and manufacture practiced. Technical and working data are supplied on the manufacture of each standard class of dress fabric in cotton, silk, wool, artificial silk, linen, canvas, etc., and of the many varieties of fancy fabrics. After a general discussion analyzing the industrial range, the following subjects are discussed in the succeeding chapters: The yarn unit; silk; thrown, spun and artificial; The yarn unit applied; Weave elements and cloth construction; Drafted patterns; Stripes; Geometric design bases—Weave compounds; Spotted and mosaic patterns; Practice in figure designing; Pile, tappet and gauze structures. The utility and function of color in the various classes of dress fabrics are illustrated and defined throughout the book. The pages carry a great number of designs and specimens which help to illuminate the text.

Union Textile Fabrication—

Roberts Beaumont $6.00

This new book considers union goods from a broad viewpoint, going far beyond the ordinary mixtures of cotton and wool, and includes combinations of wool and silk; cotton and linen; cotton and ramie; cotton and silk; hair or coarse wool and asbestos; linen and silk; wool, cotton and artificial silk, etc. Better goods—not cheaper goods—is the chief object of the author's fibre and yarn combinations, and shows how a greater textile industry can be realized by working along this line. The volume, as necessary in a complete work, treats of union products made by combining fibres before spinning, compound yarn fabrics, and woven unions, and is divided into three principal sections for the consideration of these different classes of union textile fabrication. In each of these sections complete analyses are given of the effects to be obtained by varying combinations, which represent an enormous amount of research. Original drawings and photographic reproductions of yarns and cloths are freely used to explain the text. Use of fibre and yarn combinations offers greater possibilities for the further development of textile manufacturing than the working out of an American type of design. In fact, such combinations probably offer the broadest field for special fabrics and novelties that is open to the textile industries. The progressive designer, spinner and cloth manufacturer will find the volume very instructive and profitable reading. 350 pages; 200 illustrations.

Both books for sale by the Book Dept. of

BRAGDON, LORD & NAGLE CO.

334 Fourth Ave., New York

amounted to $87,859,000 compared with $92,067,000 for the previous 12 months. Cotton cloth constituted about two-fifths of these imports in 1925, laces and embroideries accounted for almost $20,000,000, cotton wearing apparel for $11,000,000, and cotton yarn for $5,000,000 the balances comprising cotton waste and various other manufactures of cotton.

The United Kingdom supplies the bulk of the United States imports of cotton cloth, its share having been 167,681,000 square yards valued at $33,636,000 during the fiscal year, 1924, and 136,095,00 square yards with a value of $29,641,000 during the 12 months ended June, 1925. This decline in imports of British cloths is largely accounted for by the falling off in demand for imported broadcloths and poplins. American manufacturers now produce this type of goods in qualities satisfactory to the consuming public, according to the trade press, which believes that broadcloths have made a place for themselves and that they will become a staple line in the American market.

Wool and Silk Manufactures

Imports of wool manufactures during the 12 months ended June, 1925, were valued at $56,579,000 comprising $22,670,000 worth of wool fabrics, $16,554,000 of carpets and rugs, and $11,076,000 of wearing apparel, the balance including yarns and various other manufactures of wool. The United Kingdom is the chief source of the imports of wool fabrics, having furnished 8,106,000 lbs. of woolens valued at $14,850,000 and 742,000 lbs. of worsteds with a value of $1,747,000 in the fiscal year, 1925. China sent 720,189 square yards of carpets and rugs valued at $4,917,000 to the United States during the 12 months ended June, 1925, while 566,135 square yards with a value of $4,987,000 came from Persia.

Silk manufactures to the value of $36,780,000 were imported during the fiscal year, 1925, of which amount broad silks constituted $13,819,000 and pile fabrics for $3,372,000, while wearing apparel accounted for $7,608,000 and laces and embroideries for $4,127,000. Over half of the broad silks, 1,663,000 lbs., valued at $8,292,000, came from Japan.

Business News

Representative of English Loom Builder Here

Harry Moore, representative of George Hodgson, Ltd., Bradford, England, manufacturers of all classes of looms, etc., is now in this country, on his return from an extended trip through the Orient, in the interests of his firm, visiting Australia, Japan, China, New Zealand, and other countries there. Mr. Moore commented upon the wonderful growth of the textile industry in that part of the world, stating that there were a number of fine large plants there working under favorable conditions. He expects to sail for England on Sept. 30. While in this country, he is making his headquarters with Edward Jefferson, 19-21-23 South Second Street, Philadelphia, the representative for his firm in this country.

Appointed Carolina Representative

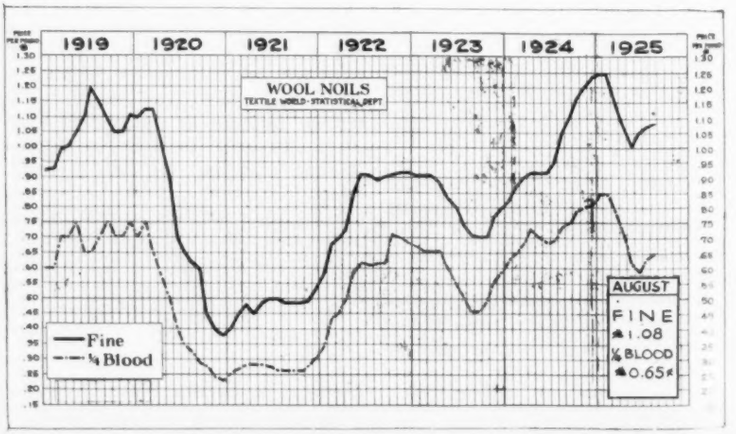
S. M. Sloan, manufacturers' agent of Greenville, S. C., has been appointed South Carolina representative for Besse, Osborn & Odell, Inc., sheep skin tanners, 51 South Street, Boston. Mr. Sloan has also been appointed representative in the two Carolinas for the Moccasin Bushing Co., Chattanooga, Tenn., manufacturers of oil-less bearings.

To Represent Detroit Graphite Co.

Arthur C. Jones, Jr., of Atlanta, Ga., has accepted a position with Detroit Graphite Co., Detroit, Mich., as special textile representative in Georgia and Alabama. Mr. Jones will work under the jurisdiction of the district office of the company in Greenville, S. C., confining himself to the textile mills in the two states named above. He was associated with The Barrett Co., for a number of years.

Sipp Machine Co. Outing

The seventh annual outing of the employes of the Sipp Machine Co., Paterson, N. J. manufacturing silk machinery, was held Saturday, Sept. 12 at the Regina Roost. Athletic games and events occupied the afternoon while dancing was enjoyed both afternoon and evening.



Issues Practical Forms of Cotton Staple Standards

WASHINGTON, D. C.—Decision to issue practical forms for 17 lengths of staple in American Upland cotton and 4 lengths of American Egyptian cotton has been announced by Secretary of Agriculture Jardine in an amendment to the order establishing official cotton standards of the United States for length of staple. The amendment becomes effective Aug. 1, 1926.

The 17 lengths of staple in American Upland cotton are 3/4 inch; 7/8; 15/16; 1; 1 1/32; 1 1/16; 1 3/32; 1 1/8; 1 5/32; 1 3/16; 1 7/32; 1 1/4; 1 9/32; 1 5/16; 1 11/32; 1 3/8, and 1 1/2. The 4 lengths of staple in American Egyptian cotton are: 1 1/2; 1 9/16; 1 5/8, and 1 3/4 inches.

The Department of Agriculture points out that heretofore the lengths of American Upland cotton in 32nds of an inch and the 1 9/16 inch length of American Egyptian have not been represented by type samples. The practical forms for these lengths of staple will be ready for sale by the department soon after Jan. 1, 1926.

As to the question of "character" of cotton in relation to the staple standards, over which there has been some misunderstanding in the trade, the department has issued the following statement:

"The obvious purpose of the original order issued Oct. 25, 1918, establishing staple standards was to make the inch rule the standard of length. No departure has been made from this purpose in the amendment. Physical representations of the standards have been issued and distributed from time to time to facilitate their interpretation. As these types represent length only, it has been believed that differences in the character of cotton used in their preparation might lead to some difficulties in their application.

"To remove the possibility of such difficulties, the department invited leading organizations of cotton growers, merchants and spinners to send representatives to Washington July 27 last, to collaborate in a decision as to the proper character of the cotton to be used through the range of the length standards. Cotton of normal, uniform character and medium body was selected, and this character is to be maintained in all issues of the new length types.

"While the new types, like those at present in use, will officially represent length only, it is believed that the matter of 'character' has been well taken care of and that the usefulness of the staple standards has been greatly increased."

Philadelphia Wool Market

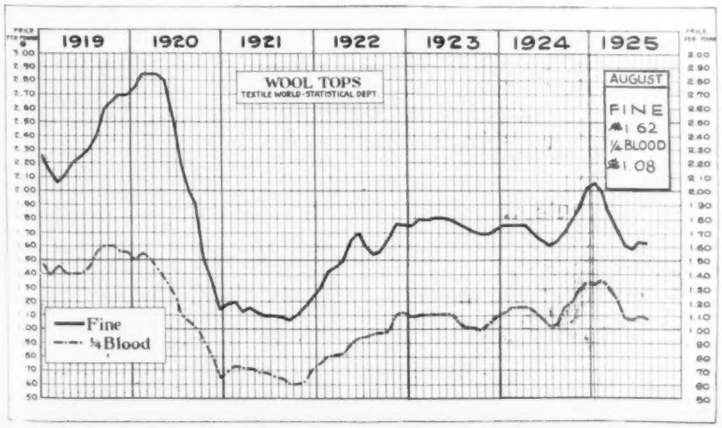
(*Continued from page* 111)

noted, 150,000 lbs. of original being moved at private terms and a smaller lot of fine at 40c to 42c, costing approximately $1.25 clean. This is in contrast to the situation in woolen grades which are quiet, dealers reporting a lack of interest in pulled, scoured and noils, with prices easier, particularly in noils. Good B supers have been offered to dealers at 85c while mills are able to buy A supers at $1.05, representing declines of five cents from previous quotations.

Larger Supply of Noils

Spinners of worsted yarns are more active and therefore are selling larger quantities of noils than during the last two years and larger supplies of all grades are coming into the market. This fact, when considered with a smaller demand from woolen mills, explains the weakness developing in prices. Quotations for average domestic noils are: $1.00 to $1.05 for fine, 90c or slightly higher for half blood, 75c for three-eighths and 60c for quarter. Fine noils are in best demand. Carpet wools are unchanged, dealers waiting until more definite quotations have developed as a result of sales abroad.

WALHALLA, S. C. Kenneth Cotton Mills have commissioned J. E. Sirrine & Co., Greenville, S. C., to provide plans and specifications for a new packing and shipping building. The new structure will be in the nature of an addition to their present plant to relieve congested conditions in the weave room. It will be 40 ft. square, one story in height and of slow burning mill construction. Building will be started as soon as possible after the plans and specifications have been completed.



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Automobile Fabrics and all kinds of Fancy Woolen and Worsteds.
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The TEXTILE CLEARING HOUSE

Men Wanted

Men Wanted

SUBSCRIPTION SALESMAN WANTED

The TEXTILE WORLD has an opening for another travelling representative in the southern states (Automobile furnished) to secure subscription orders, directory information, gather news, etc. Must have textile knowledge and successful sales experience in that territory, but not necessarily in this line.

Good salary; travelling expenses and bonus will be paid to a high grade man.

State experience and give reference.

Address or call on

A. D. OLIPHANT, Manager,
Southern Office—Textile World, Masonic Temple, Greenville, S. C.

COLORED YARN SALESMAN WANTED

Mill of 25,000 pounds weekly capacity colored yarns for knitting and weaving trade desires services of capable party familiar with trade using these yarns. In replying, state age and advise fully experience and qualifications. All applications treated strictly confidential.

Address Adv. 714, Textile World,
334 Fourth Ave., New York.

DESIGNER

Want an experienced Designer on fine men's wear worsted in a Philadelphia mill. Must know colors and be able to create new designs and patterns. State in full confidence, age, experience, reference, etc.

Address Adv. 708, Textile World,
828 Drexel Bldg., Phila., Pa.

OVERSEER OF WEAVING

A large silk mill in Rhode Island (near Providence) requires a night overseer. Permanent position. Silk or fancy cotton goods experience. Give full particulars of experience, education, age.

Address Adv. 703, Textile World,
334 Fourth Ave., New York.

FIXER

on full fashioned silk hosiery machine. Competent man with experience in knitting, fixing, and handling help. Interesting for right party.

Address Adv. 715, Textile World,
828 Drexel Bldg., Phila., Pa.

WORSTED DESIGNER

Large New England worsted mill desires experienced designer. Knowledge of worsted and woolen dress goods and coatings essential.

Address Adv. 709, Textile World,
334 Fourth Ave., New York.

Position Wanted

A-1 MECHANIC on Wildman Spring Needle Body Machines, also Latch Needle. Capable designer, desires position. Good references.

Address Adv. 721, Textile World,
334 Fourth Ave., New York.

DYER'S HELPER WANTED

New England Mill has opportunity for a young man with helper's experience to learn skein dyeing of pure silk and Rayon. Quick opportunity for becoming a dyer, if qualified.

Address Adv. 698, Textile World
334 Fourth Ave., New York

TO COTTON AND SILK PIECE GOODS FINISHERS:
Young man, 30, college graduate, with seven years laboratory, manufacturing and accounting experience in cotton piece goods dyeing and printing plants wishes a position with opportunity for advancement. He is particularly interested in plants doing rayon mixtures. At present employed as chemist and superintendent of small dyeing plant.

Address Adv. 700, Textile World,
334 Fourth Ave., New York.

WORSTED DRAWING

Foreman Wanted for mill in Philadelphia district. Good opportunity for one who is an expert in English open and cone drawing. Must be competent to take full charge of room, and get out good work.

Address Adv. 726, Textile World
828 Drexel Bldg., Phila. Pa.

SILK DYER WANTED

New England Mill situated in an attractive town wants a skein silk dyer for pure silk and Rayon. Experience in both preferred but not necessary if thoroughly experienced in one and willing to learn. Salary and steady work.

Address Adv. 699, Textile World
334 Fourth Ave., New York

Man—27—University and Textile School Training

Year's experience as executive of small mill, desires position in mill or textile mercantile house.

Address Adv. 724, Textile World,
334 Fourth Ave., New York.

R. I. Sales Campaign Ends

(Continued from page 36)

durability were another feature at the Joseph Benn booth.

B. B. & R. Knight, Inc., in addition to a line of fine cotton cloths had a new waterproof cotton fabric "Hermetie" on display. New silk broadcloths and rayon fabrics were in the Lorraine Mfg. Co. booth together with ginghams and fine worsteds.

Fine point Bolivia for women's coats was shown by Guerin Mills, Inc. The Lebanon Mill Co. had a new line of knitted rayon and balbriggan fabrics.

Among the thousands who visited the exhibit were persons in every walk of life, a majority of whom saw for the first time that nationally known fabrics were made in their own State.

"The success of the Rhode Island Loyalty League's textile exhibit and Textile Appreciation Week which were the closing feature of the League's campaign to promote the welfare of the textile industry in the State, exceeded our greatest expectations," declared E. F. Walker, managing director of the campaign. "The exhibition gave thousands of residents of Rhode Island an opportunity to see the quality of goods produced in mills of their own State and also the novel fabrics which New England ingenuity has created. Co-operation has been given the mill men in their efforts to keep the mill wheels turning and the thousands of mill operatives employed."

U. S. Senator Jesse H. Metcalf is head of the Rhode Island Loyalty League, the executive committee of which will meet in the near future to receive a report on the results of the campaign and the textile exhibit. Governor Aram J. Pothier is vice chairman. Theophile Guerin, president of Guerin Mills, Inc., and head of Rhode Island Textile Association, is chairman of the board of directors, and E. F. Walker, secretary-treasurer of the Rhode Island Textile Association, was managing director of the campaign.

Further Water Restrictions at Durham, N. C.

DURHAM, N. C.—Effective last Sunday restrictions on the usage of water by the local manufacturing establishments were placed in force, according to a statement by R. W. Rigsby, city manager, as further precaution against a water famine. Agreement was reached between the management of the various plants and the city manager regarding the curtailment of the use of water, and letters were mailed to the various plants requesting them to curtail the use of water 50% from the time work was completed on Sept. 12.

The new order means that the factories and mills will shut down their plants half of the time until the water shortage is relieved by rain, unless the plants can be operated on half the amount of water used daily.

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Position Wanted

COTTON SPINNING

Position Wanted

By man of excellent qualifications as second hand of ring spinning accustomed to all kinds of yarns and machinery, foreign and domestic; steady, reliable and good supervisor of help, 23 years of theoretical, technical and practical cotton mill training; would like to get in touch with some country mill where there would be a possibility of employment for a family of four workers. Write me for an interview.

Address P. O. Box 234,
Willimantic, Conn.

Superintendent Worsted Yarn Mill. Wool to Yarn (Bradford System). American, married, 25 years' experience. Spun all counts to 50s warp and knitting in gray, heather and all fancy mixtures. Good references.

Address Adv. 716, Textile World,
334 Fourth Ave., New York.

DYER, ENGLISH, now employed, desires change. Ten years unique experience on all fibers used in the millinery trade.

Address Adv. 711, Textile World,
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Situations Wanted

Manufacturers who are in need of superintendents or overseers for any department of mill work may learn of suitable men upon application by mail or telephone to C. T. DONLEVY, care Textile World, 65 Franklin Street, Boston, Mass.

TEXTILE CHEMIST. But might consider a position as boss dyer, by a man 40 years of age, American, out of work and can take a position at short notice. Worked in some of our best Textile mills, as head chemist and dyer. Has good recommendations.

O. B. 1206, Textile World, Boston, Mass.

OVERSEER OF WOOLEN OR WORSTED WEAVING. American, married, 50 years of age, worked on fine worsted, men's and women's wear, woolens of all description. Familiar with Crompton & Knowles and Automatic looms. Good references.

O. B. 1207, Textile World, Boston, Mass.

SUPERINTENDENT OR ASST. SUPT. IN HOSIERY MILL. Familiar with all classes of seamless hosiery, familiar with Banner, Wildman & Wright steady dial loopers. Good references.

O. B. 1208, Textile World, Boston, Mass.

OVERSEER OF DYEING OR ASSISTANT. American, married, 32 years of age, familiar with raw stock, worsted and union piece dyes and hosiery. Familiar with the Klauder-Weldon, Delahunty and Hussong machinery. Good references.

O. B. 1209, Textile World, Boston, Mass.

OVERSEER OF WOOLEN CARDING. Married. American, 46 years of age, worked on all classes of goods made from wool, shoddy and cotton mixes. Familiar with all makes of carding machinery. Good references.

O. B. 1210, Textile World, Boston, Mass.

OVERSEER OF WEAVING IN A WOOLEN MILL. American, married, 40 years of age, worked on suitings, overcoatings and ladies cloakings. Familiar with Crompton & Knowles loom. Good references.

O. B. 1211, Textile World, Boston, Mass.

SUPERINTENDENT OR OVERSEER OF CARDING AND SPINNING, IN COTTON MILL. 40 years of age, English, married. Worked on print cloths, sheetings, voiles, broadcloths, collar cloths and duck tire fabrics. Familiar with all makes of machinery. Good references.

O. B. 1212, Textile World, Boston, Mass.

OVERSEER OF WOOLEN OR WORSTED FINISHING. By a man 37 years of age, American, married. Worked on bolivias, overcoatings, [illegible] backs, serges and cotton warp suitings, chinchillas and worsteds. Familiar with all makes of machinery. Good references.

O. B. 1213, Textile World, Boston, Mass

RAYON

A Foreword

MOST of the epocal events in textile manufacture were history when the present generation came on the scene. Our era has been one of improvement and perfection rather than of discovery and innovation.

There is however at least one contribution which this generation has made to the industry. It is possibly one of the most noteworthy events of all time because it marks an addition to the hitherto select group of textile raw materials. More important still, the new fibre is the first successful man-made fibre.

Artificial silk, or rayon, dates back to the original Chardonnet patent in 1884 but its commercial utilization has taken place within the last quarter century. It is still more significant to note that its major development has been concentrated within the last five years.

In this latest and most interesting chapter of rayon history, the United States has played a leading role. Starting ten years later than Europe in the production of artificial silk, this country has advanced to the position of premier quantity and quality manufacturer. In addition, it has reduced the cost of production to new low levels and has led the way in discovering new outlets for the fibre. In fact it may be stated with all modesty that the present impetus in rayon manufacture and utilization had its origin in the United States and that this impulse spread from this country to the other nations of the world.

Rayon is here to stay. It will not replace cotton, wool or silk but will strengthen its position as one of the major textile fibres. It will always be more valuable as an auxiliary material than as a self-fibre. It is unfair to regard it as a competitor. It has been, and will prove still more to be, an important adjunct. It has done more during the recent textile depression in this country to boost the sales of textiles than has any other single factor. It has enabled the production of attractive novelties at a price within the reach of the average pocketbook. It could have made no greater or more timely contribution than this to the industry.

The story of rayon fires the imagination. Here is a fibre independent of the moods of Nature—dependent only upon the ingenuity of mankind. Drought, excessive rain, boll weevil, animal diseases—all these hold no terror for the rayon manufacturer. Is it any wonder, then, that its progress during the last five years has had almost as great a popular appeal as did the famous gold rush of another generation?

And in this direction flies the only real danger signal of the future. Personifying the rayon industry for the moment, it can be stated that its greatest need is to keep its feet on the ground. It is not a gold mine and never will be. It offers satisfying profits to organizations with ample capital and technical skill but it threatens many a pitfall for investors who follow purely paper schemes for the future.

With this thought in mind, TEXTILE WORLD presents in this special Rayon Supplement, the story of rayon, not as a novel but as a business romance. Out of the mass of available material on this new fibre, the editors have culled those facts which they believe will be helpful to textile manufacturers. They have reviewed the status of domestic production, with details of those firms who are at present commercial producers or whose future is assured. They have presented in a concise way the outstanding facts regarding the progress of this industry. They have analyzed the market for rayon from the standpoint of the individual branches of the industry. Finally they have secured technical contributions from leading experts, giving in detail the important phases of manufacturing technique essential to its successful utilization. They believe that this combination represents an important contribution to existing rayon literature.

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SECTION 1--GENERAL RAYON FACTS

SEVERAL years ago TEXTILE WORLD started the practice of developing annual statistics on the production of artificial silk in the United States. The results of these surveys have been published in successive annual issues and have been quoted throughout the world as authoritative information on the status of the domestic industry. This year these figures have been compiled for the semi-annual output and a forecast made for the remainder of the year and for next year. These and other vital statistics appear in the leading article of this general section of the Rayon Supplement. In addition another section of this article gives in concise form the high lights of the rayon industry, which make available to readers the important facts which everyone should know about this fibre. A discussion of mechanical development and other articles of a general nature complete this section.

Domestic Rayon Production Sets New Record

Output for First Six Months of 1925 Totalled 24,925,000 Lbs.—Total Production for Year Estimated at 54,700,000 Lbs.—1926 Output Will Probably Reach 74,100,000 Lbs.

By Douglas G. Woolf

WHEN TEXTILE WORLD predicted in its Annual Review and Forecast Number this year that the domestic production of rayon in 1925 would approximate 48,000,000 lbs., some of its readers intimated their belief that the editors had allowed their enthusiasm to run wild. It is particularly interesting to note therefore that the output for the first six months of this year was on a basis of well over that figure and that the probable total for the year will be 54,700,000 lbs. This will mean an increase of 40% over 1924. More important still, the production planned for 1926 will reach the startling total of 74,100,000 lbs., or more than 600% increase over 1920.

These statements are based on a careful survey of the field made by TEXTILE WORLD and Table I shows in detail the output of those companies which can be rated as important commercial producers. This table gives the actual production for the first six months of 1925; the estimated production for the last six months; the estimated total for the year, based on these figures; and comparisons with the years 1924 and 1926. It does not include a number of firms which have not as yet taken their place in the commercial ranks. In most of the latter cases, the production was not sufficient to make an impression on the total while in others information was not available. It is safe to say therefore that the totals given are conservative since it is probable that some of these firms will achieve commercial rating either before the end of this year or during 1926 and will therefore increase the estimated totals.

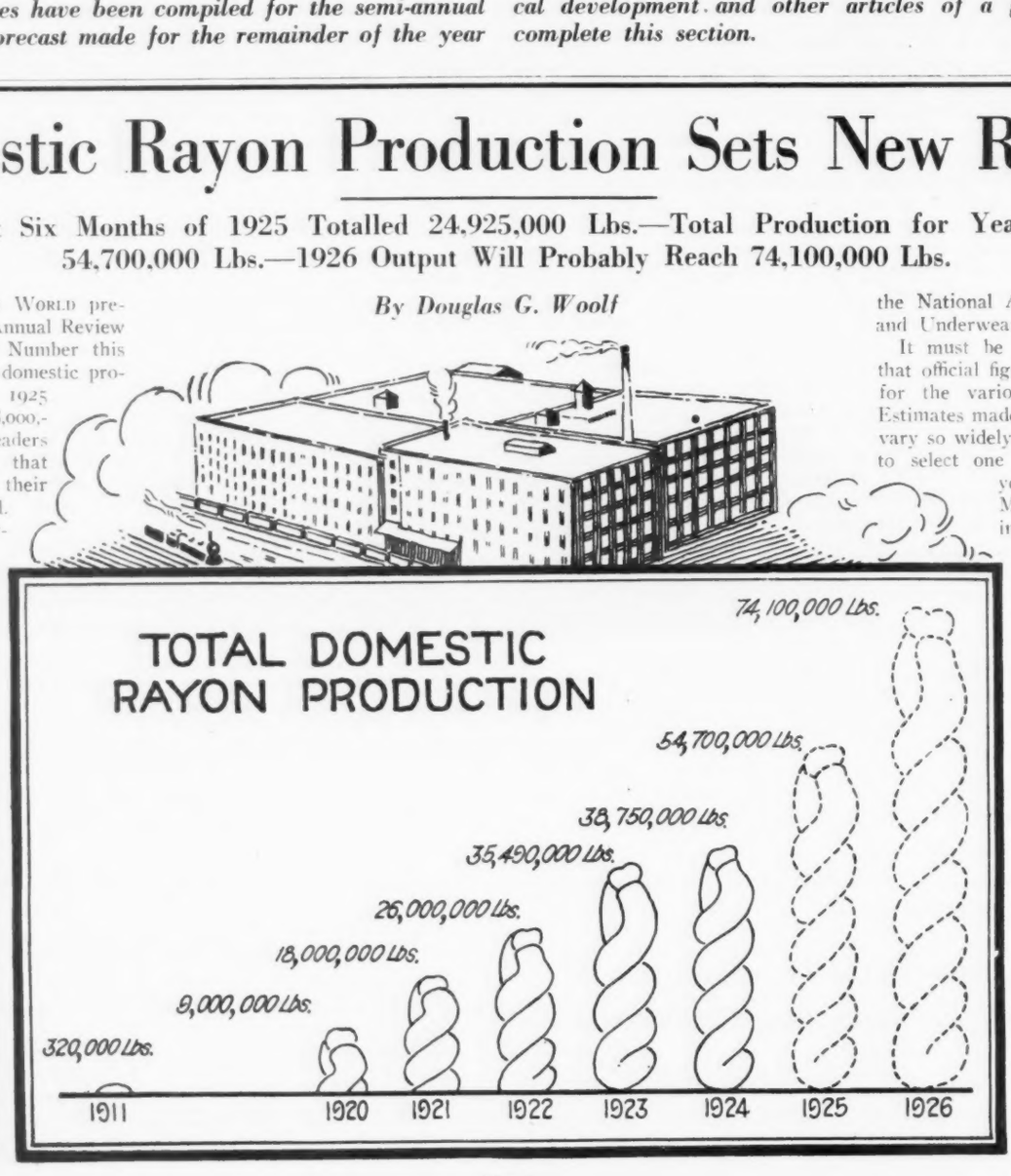


Fig. 1

These statistics enable the presentation of Fig. 1 which shows the comparative domestic production during recent years as compared with 1911, the year of first commercial output in the United States.

Imports

As the factor of imports has an important bearing on domestic consumption, Fig. 2 records the importations of this fibre during recent years for comparison with Fig. 1, which shows domestic production for the same years.

World Production

In order to present a comparative picture of the total world rayon production, Table II shows estimates for the various countries made by S. A. Salvage, president of The Viscose Co. Mr. Salvage compiled his estimate for TEXTILE WORLD for the years 1923 and 1924 and presented figures for 1922 in a speech before the National Association of Hosiery and Underwear Manufacturers.

It must be emphasized of course that official figures cannot be secured for the various producing nations. Estimates made from different sources vary so widely that it is thought best to select one authority for all the years, particularly since Mr. Salvage's estimates in the past have checked well with a fairly average opinion.

Fig. 3 shows graphically the 1924 world situation.

On the basis of these and other estimates, Table III has been compiled, showing rough figures on total world production for a period of years.

The total of 185,000,000 lbs. estimated for 1925 is a rough average of various predictions heard in the trade ranging from 170,000,000 to 200,000,000 lbs.

Individual Plants

There are given below important details of the commercial producers of rayon in this country, covering present status and future plans:

Viscose Co.—Pioneer rayon manufacturers of the United States. Started producing in 1911. Operates on Viscose process, part of its production on wood pulp and part on cotton linters. Has plants at Marcus Hook, Pa., and Lewistown, Pa., with plant of Viscose Corp. of Va., associated company, at Roanoke, Va. Also planning additional plant at Parkersburg, W. Va. Has linters pulp plant at Nitro, W. Va. Producing now at rate of 34,000,000 lbs. annually. Completion of new plant and addition to existing plants will bring total pro-

duction to 55,000,000 lbs. annually. Officers: S. A. Salvage, president; Charles E. Hendrixson, secretary-treasurer; H. J. Dingle, assistant treasurer.

Du Pont Rayon Co.—Organized in 1920 as the Du Pont Fibersilk Co., resulting from a combination of E. I. Du Pont de Nemours & Co. with Comptoir des Textiles Artificiels of Paris, France. Operates on the Viscose process through patents secured by merger with French company. First plant at Buffalo, N. Y. Additional plant put in operation this year at Old Hickory, Tenn. Doubling capacity of latter plant at present. In 1926 will be on a basis of from 12,000,000 to 15,000,000 lbs. annually. Officers: L. A. Yerkes, president; B. M. May, treasurer; Maurice Du Pont Lee, production manager.

Tubize Artificial Silk Co. of America.—Organized 1920, as outgrowth of Belgian concern. Operates under Chardonnet or nitro-cellulose process, with cotton linters as base. Plant at Hopewell, Va. In 1926 will be on a basis of more than 6,000,000 lbs. annually. Officers: Walter L. Coursen, president; Bertrand R. Clarke and Dr. E. Bindschedler, vice-presidents; Gordon A. Hardwick, secretary-treasurer; Roland L. Taylor, chairman of board.

Industrial Fibre Corp. of America.—Organized in 1920, as result of merger of American Borvisk Co. with "Snia Viscosa," Italian firm. Operating under Viscose process with wood pulp as base, through Italian patents. Italian interests in company acquired recently by Americans and new company, Industrial Rayon Corp., organized as holding company for these interests. Plant at Cleveland, Ohio. In 1926 will be on a basis of 3,500,000 lbs. annually; further expansion planned for future. Walter W. Birge, president.

American Cellulose & Chemical Mfg. Co., Ltd.—Started operation this year at plant at Amcelle, Md., near Cumberland, under cellulose-acetate process. Product marketed as "Celanese." Outgrowth of British company, which manufactures Celanese in Great Britain. In 1926 will be on a basis of approximately 3,500,000 lbs. annually. Officers: Camille Dreyfus, president; E. E. Boreham, vice-president; Lee Cadien, secretary.

The Lustron Co., Inc.—Has been operating for some years with plant at South Boston, Mass., under cellulose-acetate process. Product is marketed as "Lustron." Output ranges from 300,000 to 500,000 lbs. annually. Officers: Eliot Farley, president; H. S. Mork, vice-president; Royal Little, treasurer.

Table I. Output of Domestic Rayon Firms

Company	Total 1924 (lbs.)	First 6 months 1925 (lbs.)	Last 6 months* 1925 (lbs.)	Total* 1925 (lbs.)	Total* 1926 (lbs.)
Viscose	28,000,000	17,000,000	19,000,000	36,000,000	45,000,000
Du Pont	4,000,000	3,000,000	4,500,000	7,500,000	13,000,000
Tubize	4,250,000	2,600,000	2,600,000	5,200,000	6,000,000
Industrial	2,000,000	1,250,000	1,750,000	3,000,000	3,500,000
Celanese	.....	500,000	1,000,000	1,500,000	3,500,000
Lustron	500,000	250,000	250,000	500,000	500,000
Bemberg	.....	.....	.....	.....	1,000,000
Belamose	.....	‡175,000	500,000	675,000	§1,000,000
Acme	.....†	150,000	175,000	325,000	600,000
Total	38,750,000	24,925,000	29,775,000	54,700,000	74,100,000

* Estimated.
† Produced over 250,000 lbs. in 1924 but this figure was not available when 1924 total was compiled.
‡ Estimated, as company has no data for first half of year.
§ Will range from 1,000,000 to 1,500,000 in 1926.

American Bemberg Corp.—Organized recently as result of arrangement between J. P. Bemberg, Ltd., of Barmen, Germany and the Vereinigte Glanzstoff-Fabriken, of Elberfeld, Germany. Plant under construction located in Johnson City and Elizabethton, Tenn. Will manufacture under cupro-ammonium process. Operation will start about June, 1926, on basis of approximately 2,500,000 lbs. annually; further expansion expected. Officers: Dr. Arthur Mothwurf, president; Jacob Strauss, 1st vice-president, secretary and treasurer; Myron Falk, 2nd vice-president.

Belamose Corp.—Commercial production started this year at plant at Rocky Hill, Conn., near Hartford. Will produce 1,000,000 to 1,500,000 lbs. in 1926. Operates under viscose process. Company represents American and Belgian interests. Officers: Theophile Guerin, president; E. L. Milliken, treasurer.

Acme Artificial Silk Co.—Organized 1920. Plant at Cleveland, O. Expects to produce 600,000 lbs. next year. Officers: P. S. Green, president; C. P. Green, treasurer and general manager. Viscose.

Other firms.—Other rayon producing companies, which have not yet reached large scale production or about which definite information is not available include:

Cupra, Inc., Clifton, N. J.

James H. Hooper, Mfg. Co., Baltimore, Md.

Klis Rayon Corp. of America, Boston, Mass.

Lyons Artificial Silk Co., Sellersville, Pa.

Pacific Cellulose Co., Inc., Walnut Creek, Cal.

Rayon Silk Co. of America, Chester, Pa.

It must be emphasized however that the above list is not entirely comprehensive. Such remarkable interest has been shown in the rayon industry, during the last year particularly, that numerous ventures have been rumored or projected, about which only meager and unofficial information is available. There have been well over 100 firms organized or attempted in this field in the United States during the last five years. Many of these have fallen by the wayside. Others are still in existence but have not become important commercial factors. Still others are regarded as purely stock jobbing schemes. The statistics in the above article are based on known factors only and as such may be ultra-conservative but certainly are not imaginative.

Table II. World Rayon Production by Countries

Country	1922	1923	1924
U. S. A.	23,500,000	35,400,000	38,750,000
England	15,340,000	16,500,000	23,947,000
Germany	12,584,000	13,000,000	23,672,000
Italy	6,292,000	10,000,000	18,480,000
France	6,292,000	7,700,000	12,333,200
Belgium	6,292,000	6,000,000	8,874,800
Switzerland	1,887,600	3,700,000	4,004,000
Holland	2,516,800	2,600,000	3,366,000
Austria	1,573,000	Not est.	2,640,000
Poland	943,800	Not est.	1,540,000
Czechoslovakia	629,200	Not est.	1,293,600
Japan	.....	Not est.	1,199,000
Hungary	1,887,600	Not est.	616,000
Spain	.....	Not est.	184,800
Sweden	.....	Not est.	176,000
Russia	.....	Not est.	88,000
Other countries	.....	2,100,000	.....
Total	79,738,000	97,000,000	141,164,400

Manufacture by Cotton Mills

Finally, it should be stated that this presentation does not take into account a tendency which is still indefinite but on which much rumor is available. This involves the manufacture of rayon by cotton mills themselves. The writer is informed that three New England mills have contracted for such installations but that

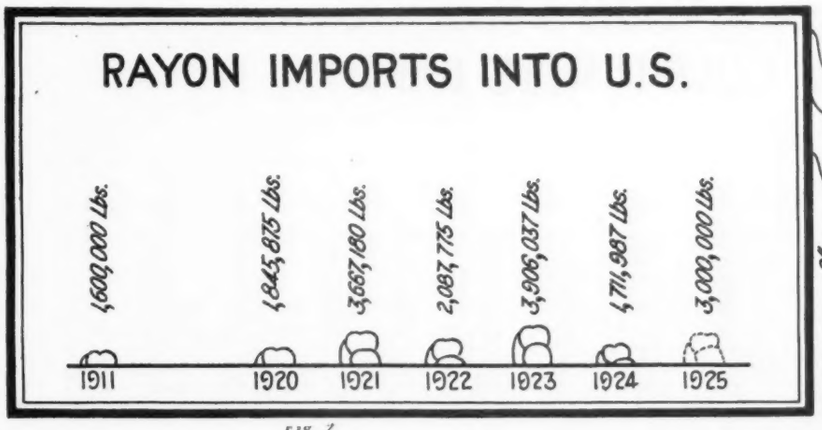
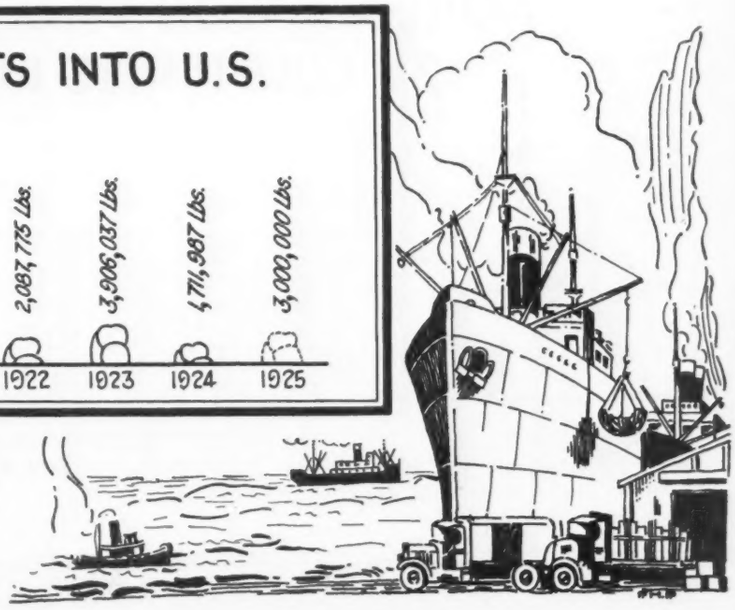


Fig. 2



announcement at this time is premature. Probably this situation does not affect the above totals to any appreciable degree but it might well be a factor to be reckoned with in the future. Previously, such a development has been dismissed as uneconomic. Theory however would have to give way before fact. It is possible that mechanical standardization in rayon manufacture, plus the advantage a mill consumer possesses in not having to package its product in saleable form, may enable the successful operation of such small units. At any rate, this situation is an exceedingly interesting—and possibly the most far-reaching—phase of the story of rayon.

Bird's Eye View of Rayon Industry

ALTHOUGH the various articles in this supplement cover comprehensively the production and utilization of rayon the following concise presentation of outstanding facts has been prepared in order to give the reader a bird's eye view of the industry as a whole.

What It Is

Rayon, or artificial silk, is a lustrous, continuous thread formed by dissolving cellulose, either as cotton linters or wood pulp, in a suitable solvent; passing this fluid through a spinning machine; solidifying the product in a fixing bath; combining and twisting the resulting filaments into a thread, purifying and bleaching this thread, and finally transferring it into the type of package in which it is to be sold or used.

Processes of Manufacture

There are four major processes of manufacturing rayon and these fall into two distinct groups:

A. *Regenerated Cellulose:* Rayon manufactured by the processes included in this group is chemically the same as the raw material from which it is made. That is, the cellulose is dissolved and then "regenerated" in the form of a textile yarn. This group includes the following processes:

1. *Viscose Process:* Involves the dissolving of either wood pulp or cotton linters in caustic soda and carbon bisulphide to form cellulose xanthate; and regeneration of the cellulose after spinning by neutralization of the caustic soda and chemical removal of the sulphur. First Viscose patent taken out in Great Britain by Cross and Bevan in 1892. This process now the basis of the layer proportion of the world's output of rayon.

2. *Nitro-Cellulose Process:* Involves the nitration of cellulose, in the form of cotton linters, by a mixture of nitric and sulphuric acids; dissolving of this nitro-cellulose in a mixture of alcohol and ether; the spinning of this solution into a thread; and the subsequent regeneration of the original cellulose by denitration of the thread. Represents the original process discovered by Count Hilaire de Chardonnet and patented by him in 1884.

3. *Cupro-Ammonium Process:* Involves the dissolving of cellulose, usually in form of cotton linters but sometimes wood pulp, in an ammoniacal solution of copper; spinning of this fluid; regeneration of the original cellulose by neutralizing the ammonia and chemically removing the copper. Originally patented by Bronnert in 1900. This process has been developed most extensively in Germany.

B. *Cellulose Acetate:* Rayon manufactured by this process is not chemically the same as the original raw material but is a compound of the cellulose with acetic acid groups. Process involves the treatment of bleached cotton linters with acetic anhydride; the dissolving of the resulting cellulose acetate in acetone; the spinning of this solution and coagulation of the resulting filaments by a current of warm air; and the transfer of this cellulose acetate, now in the form of a thread, to the type of package desired. It will be noted that no purification is required after the spinning. This process was discovered at an early date but not developed until 1901 by Cross & Bevan; and in fact has only recently been brought into extensive commercial use.

Table III. World Rayon Production by Years

	Lbs.
1914	26,000,000
1918	35,000,000
1919	40,000,000
1920	50,000,000
1921	65,000,000
1922	79,738,000
1923	97,000,000
1924	141,164,000
1925	*185,000,000

* Estimated.

Raw Material

It will be noted from the above that both cotton linters and wood pulp (mostly spruce) are used as a base. Formerly cotton linters were employed exclusively in the nitro-cellulose, cupro—ammonium and acetate processes while wood pulp was the only raw material used in the viscose process. Recently however there has been an alternative use of cotton linters in the latter process; and wood pulp has been used to a slight extent in cupro—ammonium manufacture. Thus far the nitro-cellulose and acetate processes have employed nothing but cotton linters.

The relative advantage of cotton or wood as a raw material is a moot question. Some technicians claim that the former material gives a rayon of greater tensile strength but others state that, given the same process, rayon made from linters is no stronger than that made from wood pulp. It is agreed however that the former material results in a somewhat softer product, more nearly resembling real silk. One company, in shifting part of its production to linters, claimed that an important advantage was greater uniformity in the raw material, since it produced its own linters pulp and could control its characteristics. It is stated however that marked improvement has been made recently in the manufacture of wood pulp for the rayon industry and that pulp makers are testing their product systematically to determine the viscosity of the solution that can be made from it. Just now, it is possible to hear one authority claim that cotton is destined to be the universal raw material in the industry—and another make the

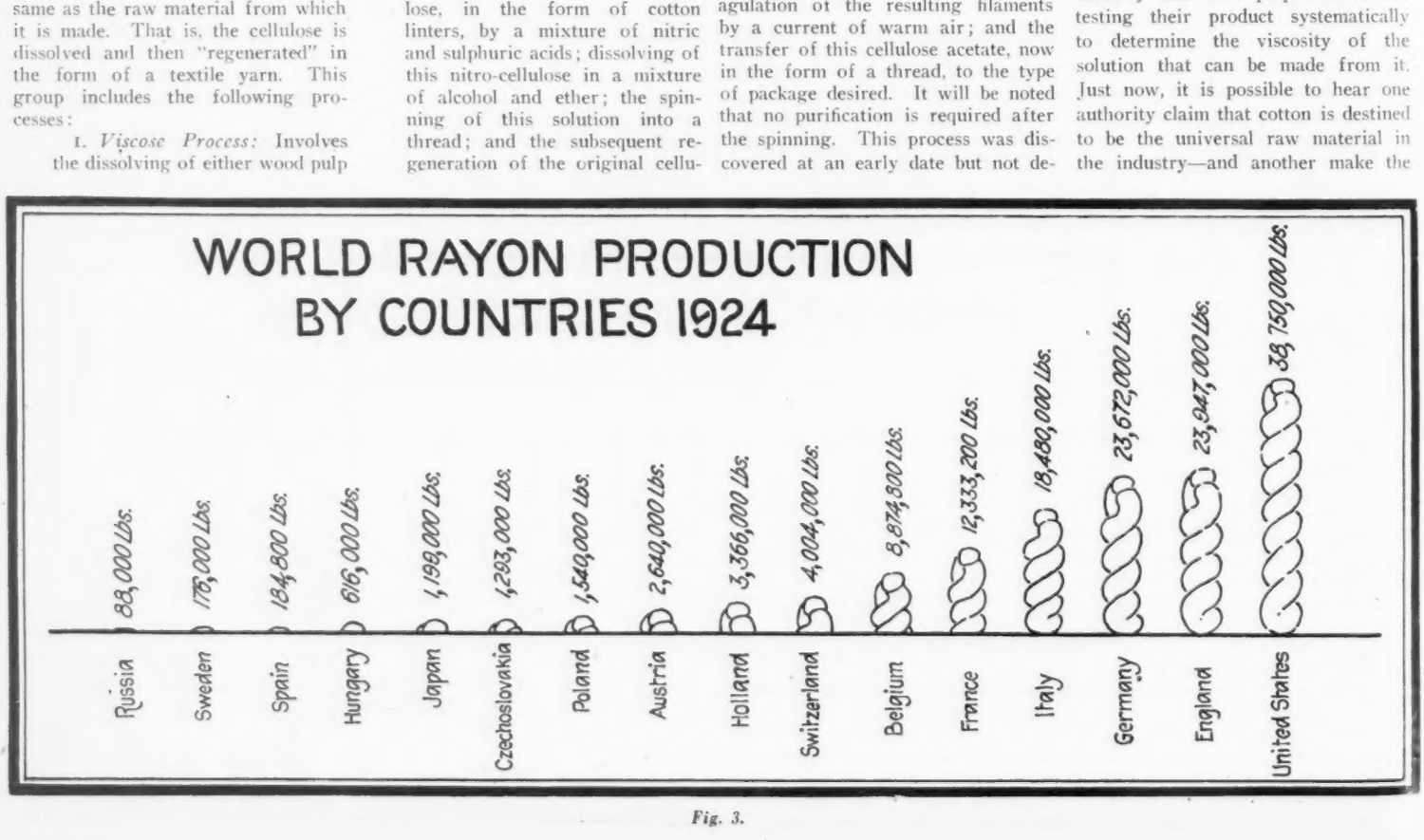


Fig. 3.

same statement for wood. This would indicate that further research investigation is necessary.

Essentials of Manufacture

In view of the widespread interest manifested in rayon today, it is pertinent to set down the outstanding requirements for its successful production on a commercial scale:

1. *Technical Skill:* This is paramount. Rayon manufacture involves chemistry and physics; consequently chemists and engineers with adequate experience are essential as a nucleus. In addition, workers must be trained carefully and supervised vigilantly. As the industry grows there will naturally be an ever-increasing supply of personnel, both executive and operative. In fact today the "secrets" of manufacture are far less the possession of a sacred few than they were five years ago but there is still a long ways to go before reliable technical assistance is easily available.

2. *Capital:* Expensive plant and research investment is necessary before rayon can be produced commercially; consequently ample working capital is essential to carry a company through the experimental stages. Experts have estimated that a minimum efficient unit for production of rayon for sale is one with a capacity of 6,000 to 7,000 lbs. per day—and that a capital of $3,500,000 is advisable for such a unit. Naturally a company planning to consume its own product can afford to operate a less extensive plant with a corresponding decrease in plant investment. The writer was told by a student of this situation that a cotton mill could produce rayon efficiently on a basis of 800 lbs. per day, with an investment of $1,000,000. Whether such a tendency materializes is a question of the future—and depends upon a rather complicated combination of factors.

3. *Equipment:* For many years the manufacture of rayon was particularly difficult because it involved the building of most of the equipment to specifications. Recently there has been a marked tendency toward standardization and it is possible that this one factor has more bearing on the future development of the industry than any other.

4. *Location:* A rayon plant should be situated near an ample supply of pure water; adjacent to a plentiful and intelligent labor supply; and provided with suitable transportation facilities. Climate is not of paramount importance as artificial air conditioning is always employed. In these particulars, it is not essentially different from textile manufacture in general.

Summing up, it may be stated that continued extension of rayon manufacture and use means progressive modification of the fundamental requirements for its promotion. As technical advice, supply of ordinary labor, and equipment become more easily available, the industry will become less exclusive and, consequently, more highly competitive. This has proved true in dye manufacture and other industries—and is an obvious fact. However, the writer is firmly convinced that, as it stands today, the rayon industry is not one to be entered casually or without painstaking preliminary investigation.

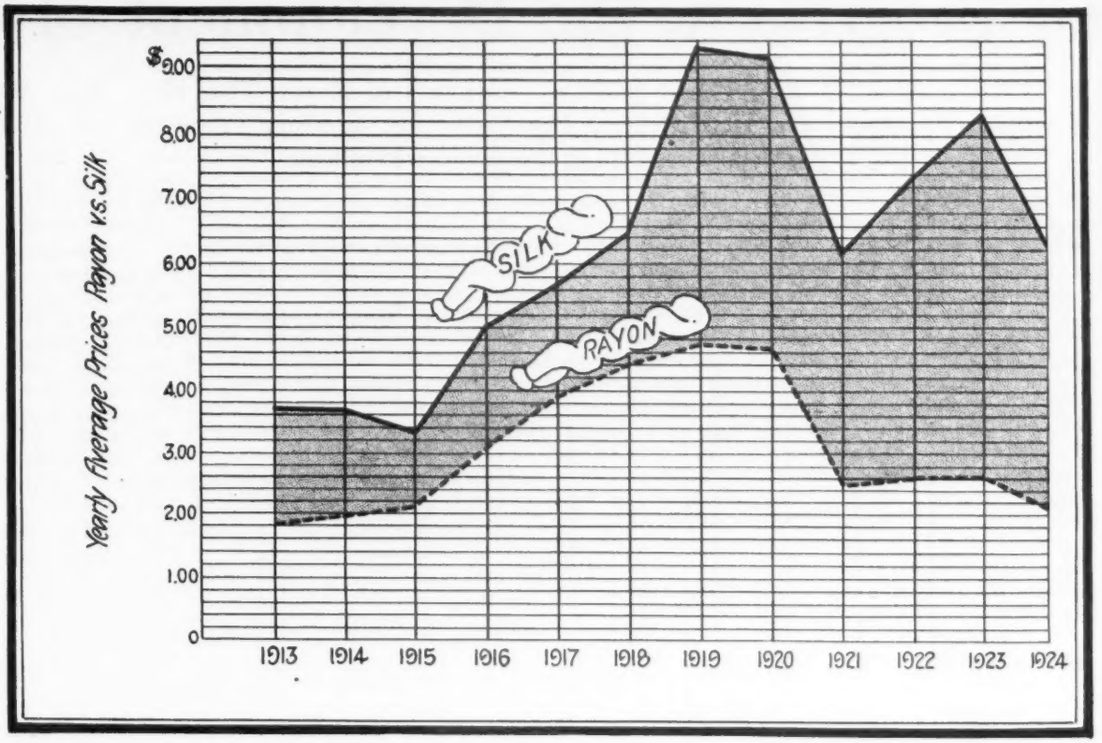


Fig. 4

Advantages of Rayon

The qualities which have advanced rayon to a permanent place in the ranks of textile fibres are, primarily, its luster, its cheapness, its durability as now manufactured, and its decorative possibilities in combination with other fibres.

Price Situation

Of these factors, none is more important than that of price. Controlled by man and not by nature, the supply of this fibre can be adjusted to conditions of demand; consequently it possesses price stability impossible in cotton, wool or silk. Any textile manufacturer knows the value of such a characteristic. It has placed beautiful novelties within the reach of the average pocketbook. Its continued expansion depends largely upon the maintenance of this cheapness and uniformity.

That such maintenance is likely goes without saying. Increasing competition; advantages of large scale production; efficiencies resulting from chemical and mechanical perfection—all these factors presage lower rather than higher prices for the broad future. See Fig 4.

Where It Goes

The most complete tabulation of the apportionment of the domestic rayon output to the various consuming industries is that compiled by the Viscose Co., shown in Table IV.

Authorities agree that the percentage used in cotton and wool goods weaving is destined to expand very materially.

Domestic Quality

It is not necessary for one to be a blind nationalist to concede the superior quality of domestic rayon, as compared with that produced in other countries. Both dealers and consumers testify to this fact and it has the further endorsement of such an impartial body as the U. S. Tariff Commission, in its report on artificial silk.

Technical Developments

Outstanding technical developments in rayon manufacture and use have been the development of the finer filaments in all the processes, with corresponding reduction of the artificial sheen and increase in the softness of its beauty; perfection in the dyeing art, involving particularly the development of special dyes for certain types of rayon; utilization of the finer sizes by consumers; and the use of spun rayon, and yarns blended from rayon and other fibres. The latter development is one which can be predicted safely as destined to expand and become increasingly more important.

The Future

The writer would be rash to attempt a prediction as to future possibilities of rayon. Five years ago, the industry would have been amused at the idea of 150,000,000 lbs., being consumed annually. And yet, in that short period, this goal has been reached and passed.

What of tomorrow? No one knows. It is impossible to place 200,000,000 lbs., 500,000,000 lbs. or any other figure as a limit. Style changes will affect the situation from time to time, of course, but over the broad future there appears no reason why the use of rayon should not expand continually. Today its output is about 1½% that of cotton and 3½ to 4% that of wool. These percentages are bound to increase. Who can say how much?

Table IV—Consumption of Rayon by Industries

Per cent Used in	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
Hosiery	30	40	47	65	56	45	40	28	25	23	24	22
Knit	17	5	3	5	11	15	17	17	21	29	26	25
Silk	10	10	12	5	9	15	18	18	13	12	11	15
Cotton	10	12	14	15	12	13	13	13	10	9	10	11
Underwear	—	—	—	—	—	—	—	1	1	2	4	5
Braids	10	5	3	2	3	4	5	13	14	10	11	10
Upholstery goods	3	5	2	2	2	2	2	2	2	2	2	2
Plush	15	15	15	3	4	3	2	3	3	1	1	2
Wool	3	3	2	2	1	1	—	1	1	1	1	1
Miscellaneous	12	5	2	1	2	2	3	4	10	11	10	7

Lines of Progress in the Development of Rayon

Rayon Has Finally Acquired a Self-Established Position—Features of Rayon That Have Been Modified to Meet Requirements of Progress for a More Refined Fibre—Advent of Finer Filaments—Possibilities of Rayon Crepe—Certain Dyeing Problems

By Dr. J. Merritt Matthews

WHEN we consider over what a brief space of time rayon has been utilized commercially as a textile fiber, we must, perforce, be truly amazed at the commanding position it has acquired. Though it has been quite a number of years since Count Hilaire de Chardonnet first showed the world that it was possible to manufacture a silk-like fibre from a cellulose solution, it was really not until the perfection of the viscose method of spinning such a fibre that the great vogue of artificial silk, now called rayon, came into being. It is not possible for us to say at this time whether it was the development of the viscose silk that brought this great growth of this business about; it may have been simply a coincidence, and the artificial silk business, based even on the nitro-cellulose silk of Chardonnet alone, might have reached the present heights unaided by any other processes of manufacture.

Be this as it may, the rayon industry at the present time has certainly gone far ahead of anything that was ever conceived for it by the discoverer of this interesting product. Its great progress has really been inspired by the persistent and never satisfied demand of women for a lustrous and brilliant textile material. It was soon realized that natural silk alone was not equal to the demand that was being put upon it; and moreover, the cost of the natural fibre militated against its universal employment, to say nothing of its restricted production. Nor did it seem possible to alleviate either of these two limitations, for throughout the world the cost of labor was continually rising with no vision of any future diminution, especially in the kind of labor that brought the raw silk of the Orient and Europe to our doors. Owing to these circumstances there was great pressure placed on inventive genius to produce a textile fibre that would be as acceptable as silk, but at a far lower cost and with the possibilities of an unlimited supply.

Early Troubles

Of course, in the early days of its appearance rayon was subjected to many rebuffs, and was held up to more or less scorn and contumely, and when we consider the rather imperfect nature of the product at that time it is a wonder that it made out as well as it did. In the first place, it had to weather the wrath of the silk industry as a new-comer, an alien, and an undesirable alien at that; it was regarded as an interloper that was sure to degrade the dignity of a long established textile aristocracy. It also had to survive the suspicions and unfriendliness of consumers who were inclined to regard it as a shoddy substitute, an adulteration, foisted upon them by an unprincipled trade. The very name, which it either adopted voluntarily or had forced upon it unawares in the early days, "artificial" silk, gave it a sort of stigma which it has been a long time in outliving. It was a kind of an orphan fibre that had no natural parents and had to be adopted as a sort of foster child by the silk industry. This was perhaps inevitable and unavoidable owing to the circumstances, for it was only through the silk industry that it could get a commercial entrance into the world.

But rayon has now grown to be a big child; it may even be said to have reached its maturity. It has grown so rapidly that it now bulks larger in girth and height than its foster parent, silk, itself. Though born of such illegitimate parents as chemistry and engineering and cast upon the world without a suitable baptismal name, it has now won for itself at least a title or cognomen, whether Christian or Hebrew we do not know; but anyway it is a distinctive name by which we may call it, though unfortunately it has neither pride of ancestry nor hope of offspring. But the name of this product is not an essential feature to its existence; it would be bound to win out on its own merits if it had no name at all. The main thing is this, that the rayon industry has become established on its own basis, like the celluloid industry or that of artificial leather—and, by the way, the latter one is also a product that lacks a distinctive generic name, for owing to a similar illegitimate origin it was born before it had acquired a name or a pedigree, and had to be foisted onto the leather family for fear that people would never know who or what it was.

Now Rich in Own Rights

But rayon has now acquired the status of a successful, though self-made, man. It is rich in its own rights, and it has earned every cent it possesses. It has commanded the respect of its fellow beings among the textile trade, chiefly by reason of its very success, but to some extent also by reason of its unquestioned qualifications. For had silk itself never been in existence or known of, rayon would have acquired a position and a dignity of its own, and would have created a department of textiles distinctive and characteristic to its special properties and possibilities. To some extent it was fortunate that it had a long established industry to adopt it in its infancy, so as to give stability and strength to its first attempts at growth and progress, for it was really some time before this synthetic child acquired the ability to walk alone. The silk industry really breathed into it the breath of life that made it a living and sentient thing, so even at the present time, rayon still considers a sort of family tie as existing between itself and silk, and perhaps it always will.

Having reached a mature, though by no means a complete growth, it is time for rayon to establish a household of its own and cease to be a more or less undesirable step-child of the silk industry. This condition is fast coming about through the enormously increased production of the rayon fibre as well as through the many fields into which its use is penetrating. It will not be many years before the rayon industry, perhaps, will have far outstripped the silk industry, not only in the quantity of its product—for this has already come about—but also in the value of its product. This is bound to come about through various improvements in the quality and properties of the fibre, for it is not to be considered by any means that rayon has reached a fixed type that cannot be altered or bettered. Demands for a fibre of certain specified qualities will in time always bring about a modification to meet such a demand; the possibilities of rayon manufacture have by no means been exhausted, and we are even now seeing a considerable change in the type and character of the fibre as compared with the former qualities of this material.

Too "Blatant" at First

When rayon first became a fixed commodity on the market and was employed in the manufacture of various kinds of fabrics, it was naturally used as silk or as a companion with silk. Its chief feature was its high luster and the continuity of its structure as a thread, thus resembling very much natural thrown silk. But it was soon realized that its luster was a little too much; it glared at you too strongly and gave the fabric into which it entered a glassy, metallic sheen. It was a little too obstreperous in its looks, too precocious in announcing its presence in a rather blatant manner. It somewhat overdid its part in imitating silk so that the imitation was too obviously seen; it seemed as if it had determined to equal silk in its luster and in doing so had overreached the mark. In other words, the presence of rayon in a fabric in any large amount fixed it in a certain "class," much in the same manner as a little touch of almost indescribable and hardly obvious overdressing in a woman "places" her as a demi-monde.

Another feature of rayon that was also rather blatant in announcing itself was its hardness, its stiffness, its wiriness, its lack of plasticity in draping and forming, its liability to mark in creases and folds; it did not have the same kindly nature as silk, but was more obstinate in adapting itself to the requirements of dress fabrics. In knit fabrics, such as hosiery, sweaters and the like, this feature was not so much of a drawback, which probably accounts for the great vogue that rayon rapidly acquired in the knit goods industry. Here it was usually spliced with either real silk or with mercerized cotton and the mixed fabric had a quality that was very satisfying and pleasing. It was also here that the trade learned that rayon possessed very good resistance to wear and its fabrics passed through a term of life that was amply sufficient for all practical purposes; in fact the fibre itself usually outlived other features of the fabric, the loss of which made it unsuitable for further wear.

Another feature that marked rayon out and somewhat limited its scope and utility, was the comparatively coarse thread in which it was manufactured. This was due, in the first place, to the comparatively coarse filaments employed as the basis of the finished thread—we say comparatively coarse, for though exceedingly fine as viewed with eye, they were much coarser than the corresponding filaments of real silk. There was such a great demand, however, for this rayon fibre in counts of 120 denier and larger, that at first there was little effort made by the manufacturers to prepare a finer thread and filament. With the growth of the industry, however, production sort of caught up on the requirements of the coarser sizes and then attention was directed to the making of finer counts. This had to be done by preparing to start with a finer structural filament, for it must be borne in mind that the rayon thread as we see it is not a single homogeneous thread, but is made up of a number of much finer filaments, much in the same manner as silk threads. These fine filaments usually number 12, 16 or 18, or more depending on the coarseness of the finished thread.

This size of the primitive filament really lay at the root of all the objections to the fibre that have so far been discussed; that is to say, the glaring luster, the wiriness and the coarseness of the thread. By reducing the size of these structural filaments it was realized that a resulting

thread could be obtained that would be softer in both its finish and its feel, which would more resemble the desirable qualities of real silk in its potentialities as a builder of fabrics, and which could furthermore be made up in much smaller sizes. For in the latter feature it was not possible to simply reduce the size of the thread by employing less of the structural filaments; this was permissible up to a certain point, but beyond this it was found that reduction in the number of the composing filaments bred disaster; the thread became relatively stiffer, there was lack of uniformity, there were too many thick and thin places, and numerous other troubles arose. But by making the fundamental filament finer it was possible to still employ the requisite number of these and yet manufacture much finer yarns.

Result of Fine Filaments

It is easy even for the untechnical man to understand that by the use of finer filaments in the thread a more subdued luster would be obtained. The luster is due, of course, to the unbroken reflection of light from the surface, and if the large rayon thread were simply one continuous large filament it would be practically like a glass rod, for the surface of this fibre is very smooth and possesses a high power of reflection; its luster would therefore would be very glassy, even more so than it is now with a thread composed of a number of filaments. But by increasing the number of filaments and at the same time decreasing their diameter, a thread of the same size can be turned out which presents a surface that is more broken up by the smaller surfaces of the constituent filaments. These smaller filaments could be produced either by employing smaller orifices in the spinning of the fibre or by drawing out the freshly spun fibre while it was still in a plastic condition and before it had finally hardened or set into its finished state. Reduction in the size of the orifices presented some difficulties; it was less possible to maintain orifices all of the same diameter; the smaller the orifices the more easily they became clogged and gave rise to imperfect and broken filaments; also a greater pressure was necessary to force the viscous solution of cellulose through the openings; a change in the thickness or viscosity of the solution had to be made; the production of the machines was seriously cut down; and so on through a long list of manufacturing troubles.

The other way out was to draw out the spun filament to a greater length and thus reduce its diameter, much in the same manner that roving is drawn out in the spinning of cotton yarns, the coarse yarn getting finer and finer until it reaches its apportioned size. A process of this sort, of course, necessitated many changes in the technique as practised in the older method of direct spinning from orifices and it presented many engineering difficulties, which seem, however, to have been more or less overcome. It is now possible to produce the filaments of rayon fibre as fine or even finer than the filaments of real silk itself, and this has not only made it possible to put on the market very fine yarns, but it has also given to the yarn a more satisfactory silky luster free from the objectionable glare that formerly marked rayon as a rather garish fibre.

The use of an increased number of finer filaments has also made the resulting yarn softer and more pliable; there is less internal resistance to the deformation of the fibre, consequently the fibre as a whole becomes more plastic, and fabrics made from it drape better and do not crease and mark up as readily. Then again, by the introduction of much finer threads the field of rayon in fabric construction is greatly extended; it no longer finds itself limited to the heavier and coarser fabrics in which it first had its vogue. Even in the field of knit goods this is of great benefit, for the finer grades of hosiery and underwear fabrics can now adopt rayon into their family.

Another advance in the improvement of rayon is an attempt to lessen its garishness and to extend its suitability for fabric construction has been a study of the possibilities of chemical treatment. If we bear in mind that rayon is really a cellulose fibre we can at once appreciate its close relationship to cotton, and it is therefore natural to look for at least some similarity in their chemical reactions. The chief chemical treatment to which cotton has been found susceptible is the action of strong solutions of caustic soda giving rise to that well-known alteration product of cotton called mercerized cotton. It has recently been found possible to pass rayon through a mercerizing process very similar in technique to that of cotton. While it is well-known that rayon is much injured by treatment with dilute solutions of caustic soda, especially if these solutions are at all elevated in temperature, it has been found that such deterioration in strength and structural integrity can be avoided by the use of a rather concentrated solution of the alkali and by employing low temperature.

Rayon Crepe Possibilities

The effect of this mercerizing action on rayon, however, is somewhat different from that on cotton. While in the latter case the fibre is distended and given a higher luster if the reaction is carried out under tension, the effect of simply mercerizing rayon without tension is to reduce the high luster of the original fibre and to give it a rather crinkly character. We can at once see what possibilities are opened by this effect. One of the great limitations of rayon heretofore has been the impossibility of employing it in the manufacture of crepe fabrics, for it was not possible to give the thread the high degree of twist that was given the corresponding silk thread for the making of these special weaves, and it was this high degree of twist that produced that peculiar quality of "crepiness" in this particular fabric, a quality that has proved itself to be in great demand in satisfying the fashionable requirements of the highest class of apparel fabrics.

This alkali treatment has to be carried out with a certain rigid technique in order to produce the results aimed at, and even as yet the process is in a rather primitive stage of development. But the potentialities contained in it are tremendously important for the rayon industry, and no doubt but open up the way for many other forms of chemical treatment that will be found capable of giving this interesting fibre a much wider sphere of usefulness. The use of formaldehyde and a certain method of drying at rather high temperatures it is also claimed is capable of modifying the rayon fibre in such a manner that its resistance to disintegration when wet is much increased. Studies made on the hygroscopic nature of rayon or the relations of the absorbed moisture to the chemical and physical constitution of the fibre, indicate that there is much field here for intensive research and that there are great possibilities in this direction towards improvements and modifications in the fiber.

The accompanying article by Dr. J. Merritt Matthews touches on some of the high lights of the present development stage of the rayon industry. One of the most interesting points brought out by this well-known authority is the progress being made in developing finer filaments of rayon. This is undoubtedly one of the most fertile fields for future research and it may be confidently predicted that progress in this direction will mean much to the further expansion of the use of this fibre.

Acetate Cellulose Dyeing

The great outstanding feature, however, in the field of rayon development during the last few years has been the perfection of the cellulose acetate form of this fibre to a point where it has become a considerable commercial success. The acetate rayon, which has received the trade names of "Celanese" and "Lustron," has had a hard path to travel in comparison with its more favored brothers, for not only has it had to overcome the enormous manufacturing, chemical and engineering difficulties in its development, but after these had been pretty well solved it was found that the new member was far different from the rest of the family. It could not be dyed in the same manner. This proved at first an almost insurmountable obstacle, but those who had set their hands to the plow in this enterprise refused to turn back. They persisted in their delusion until they made it an accepted fact, for they finally contrived by various means to originate a series of dye products that are amply able to take care of the ordinary dyeing requirements of this very perverse fibre.

Many methods had been investigated in the hope of finding some way out, and several of the dyestuff manufacturing firms brought out specially selected dye products that could be more or less used with success on the acetate rayon; but they all had their limitations, and one of the chief of these was that very special methods of application had to be employed that so set the fibre in a class by itself as far as the dyer was concerned that the latter was little inclined to bother himself with it. The use of a rather new principle in dyeing, however, was finally struck on. It was found that by taking certain dyes and forming a sort of color lake with them in combination with sulphonated fatty acids somewhat similar to turkey-red oil, a product could be obtained that emulsified or went into a colloidal suspension or a kind of semi-solution in water, and this suspension could be employed as a dyebath for the acetate rayon, as the fibre abstracted therefrom the color-lake which then became fixed within the substance of the rayon in a very permanent form. The list of dye products adapted to this process is no doubt capable of being considerably extended and there is little fear but that practically all the dyeing requirements of this kind of fibre may be properly met in this manner.

Cross-Dyeing

There is one feature of rayon in connection with its relation to cotton that it seems advisable to mention here in view of the past remarks on the dyeing problems. Many apparel fabrics are today made of silk with the addition of cotton or linen trimmings, or these two fibres are so employed in conjunction with one another in the make up of the fabric that various pattern effects are obtainable in dyeing by reason of the silk taking the color while the cotton part is left undyed. In using the more ordinary types of rayon in connection with cotton in the preparation of a similar class of fabrics this pattern effect through dyeing is not possible, as both the rayon and the cotton are dyed together. By the use of acetate rayon, however, it is possible to dye either the cotton, on the one hand or the rayon fibre, on the other hand, by the selection of the proper dyes, and hence any character of pattern effect may be obtained that is desired. We are still waiting for a method of dyeing or a series of dyestuffs that will dye ordinary rayon and leave cotton undyed or the reverse of this, but though considerable investigation and research has been made in this direction, no decisive results have as yet been obtained.

Mechanical Development in Rayon Manufacture

Description, with Illustrations, of Equipment Now Made to Produce Under the Viscose Process—Spool-Spinning Method Explained—Washing of Spools of Rayon on a Rotary Vacuum Washer—Fine Filament Rayon an Important Development

By W. O. Mitscherling

Vice-President, The Max Ams Chemical Engineering Corp., Bridgeport

RAYON is a product of cellulose; cellulose is a vegetable cell wall—a structure to protect the jelly-like substance, the protoplasm, and to function to provide rigidity and support to the living plant. Chemically, cellulose belongs to the group known as carbohydrates. Analysis of rayon shows that some of the cellulose is decomposed, since the alpha content of rayon is rarely higher than 80%–82% and about 8%–10% is degraded cellulose, the rest is water.

The industry distinguishes two types of rayon: Rayon as cellulose or its hydrated form and manufactured by the viscose, copper ammonia and nitrated cellulose processes; and rayon as a derivative of cellulose or cellulose acetate, known as "Celanese" and "Lustron."

As raw material, cotton cellulose or wood pulp can be used for all processes. For the viscose process, however, it is customary to adopt wood pulp and also in some cases for the copper ammonia process. In the cellulose nitrate and acetate processes usually, but not necessarily, cotton linters are used. Lately, a few viscose plants manufacture rayon out of linters. Whether or not this is more advantageous for the viscose process remains to be seen. It must be remembered that wood pulp manufactured today is of such uniform and excellent quality that it would hardly pay to adopt more expensive raw material unless the quality of the subsequent rayon *justifies* it.

To prepare the linters for the viscose process, they must be thoroughly purified and converted into sheets; otherwise the handling and processing is rather expensive. Naturally, linters can be dipped in caustic soda in bulk and the excess caustic soda liquid pressed out, but the pressed cakes of soda cellulose will never be uniform and the subsequent ageing (depolymerization process) of the soda cellulose will suffer materially.

Multi-Filament Rayon

Many novelties of rayon come to the public; particularly the multi-filature silks which are yarns combined of very fine filaments nearly as fine as the genuine animal silk, counting or consisting of from 0.5 to 1.5 denier per filature. Our aim is to approach nearer and nearer to the genuine silk in its appearance.

In order to produce very fine filaments, the process must be very carefully controlled since the filaments are very delicate and are apt to break during the manufacturing process. Many improvements to process this type of rayon must be made. The centrifugal or pot process does not lend itself to low deniers, and it is safe to say that a good quality of rayon, below 150 denier, must be made on parallel bobbin system spinning machines, which have perfect cross winding devices. When multi-filament rayon is produced, it is imperative that the present washing system be improved. Descriptions of the new types of bobbin washing machines will be given later.

Multi-filature silk rather fuzzes on the textile machines, that is, on machines which are usually used for the ordinary types of rayon, and the textile machinery engineers must create new improved equipment to handle delicate, fine filaments of rayon. The more and finer the filatures, the less metallic luster; or better expressed, multi-filature rayon exhibits a soft and quiet luster resembling genuine silk. Naturally, rayon of high luster will always be desired in its place. It is just a case of creating a new variety.

Mechanical Development

This paper particularly deals with improved machinery for the manufacture of viscose silk.

The pulp is bought from the pulp manufacturers in sheet form. In former years, it was to a great extent imported from Sweden and it was believed that only Swedish pulp was suitable for the manufacture of viscose. Today, both in this country and in Canada, huge plants are turning out wood pulp in hundred thousand ton lots and they are fully capable of supplying the entire industry with an excellent raw material.

A few weeks ago, the writer had occasion to visit a Canadian viscose pulp plant which not only supplies the rayon industry of Canada and this country, but also supplies European plants. Up-to-date research laboratories and responsible chemists supervise the process and try their best to satisfy the industry. For obvious reasons, it seems to be quite a venture to find out from the rayon manufacturer just what he wants. Naturally, the manufacturer of rayon knows what he wants, but would not the product be considerably improved if greater cooperation between pulp manufacturers and user could be effected?

How the chemical process is manipulated has often been described in recent literature, and it will be impossible to give directions and to provide data of every single phase from the chemical standpoint. The rayon process cannot be operated by printed directions, but by experience.

The general idea is to immerse cellulose in sodium hydrate solution in iron tanks and to remove the excess by pressure. It is then broken up in a kneading machine and allowed to stand at a definite temperature to complete a physical re-action. The resulting product is called soda cellulose; this is put into an xanthating machine and carbon bisulphide is added. The product is xanthate. The xanthate is dumped into mixers and dissolved in water and caustic soda in amounts which will give the desired percentage of cellulose and sodium hydrate. The brownish red solution is stored in tanks, filtered and aged. The filaments are formed by pressing the viscose solution mechanically through very minute holes into acid and acid salt bath. It is thoroughly washed, bleached if necessary, and dried.

Description of Apparatus

Hydraulic Press—Fig. 1: This photograph illustrates a horizontal hydraulic press particularly constructed for this industry by The Hydraulic Press Manufacturing Co. of Mount Gilead, Ohio, and used for the preparation of soda cellulose.

The press is of horizontal type with single pressing cylinder and with two auxiliary pullback cylinders located on the sides of the main cylinder. The tank which forms the central part of the press is divided into 13 equal divisions by 12 cast iron division plates. The tank of the press is 20-in. deep and 30-in. wide and has a total inside length, between the pressure plates and head, of 11 feet (two feet of which are taken up by the 12 division plates and nine feet available for pulp space). The press ram has a total run of nine feet which is sufficient to close the press opening. The press ram works through one end of the tank. The head of the box is attached to the press in such a manner as to relieve it of undue strain when the pressure has been applied.

Sheets of wood pulp are placed on edge in the press between the cast iron plates and covered with caustic soda solution. This turns the press box or tank into a combination treating tank and press box and eliminates a separate treating tank as often used in viscose plants. Thus, there is less handling and less labor.

Time of treatment must be determined in the laboratory, but is usually between one and two hours. The surrounding caustic soda solution is now drained off and pressure applied so as to remove more solution until the proper consistency has been reached.

It is generally believed that the ratio of cellulose to caustic soda is of tremendous importance to the subsequent formation of viscose solutions.

This, of course, is not quite true. It is very important that the soda cellulose is pressed as dry as possible since it has been found that if dry soda cellulose is xanthated, a much better xanthate and subsequent viscose is obtained and, in particular, the final product of rayon will have a greater tensile strength. Particulars in regard to the handling of this operation will not be given in this paper.

A possible explanation for this may be that if excess liquid surrounds the particles of cellulose, they become jellified and will not permit a thorough permeation of carbon bisulphide.

With the hydraulic press above mentioned, the ratio of cellulose, caustic soda and water can be gauged to any desired proportion.

Spinning Machine—Fig. 2: Fig. 2 illustrates a complete parallel spool spinning machine combined with rotary vacuum washer, manufactured by The Max Ams Machine Co., Bridgeport, Conn.

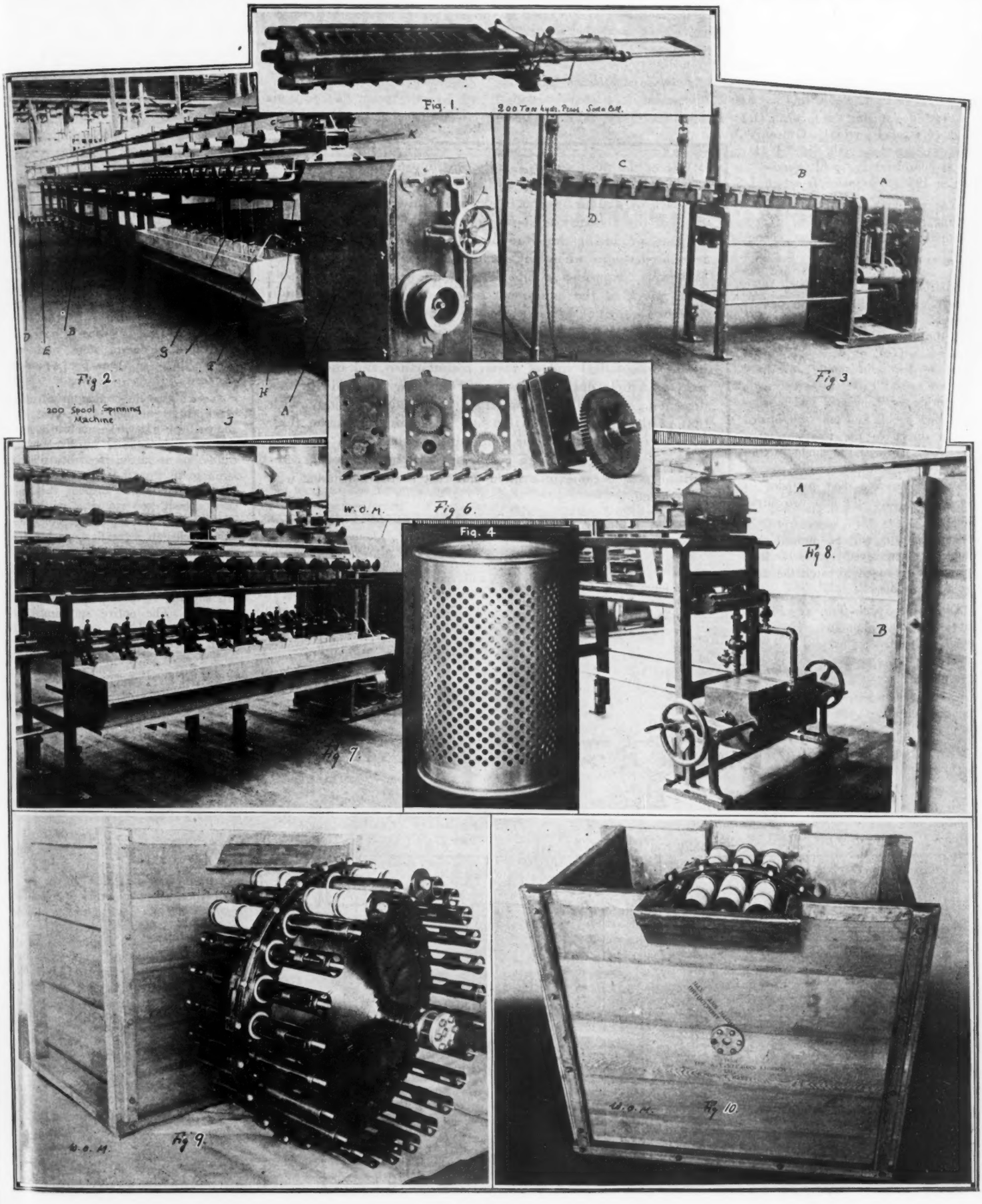
(A) represents the power unit which is built on a separate base with motor attached and is enclosed.

All controls and moving parts are enclosed and protected from injurious acid vapors. The controls consist of double compensating non-slip belt shift, regulating spool speed according to the size of thread produced and insuring absolute take-up of thread expressed in meters or yards per minute. Since the diameter of the spools constantly increases due to new layers of thread, the rate of speed decrease is so arranged that it corresponds with the thickness of thread produced. For example, a slower decrease of spool speed is required with 100 denier silk than with 300 denier silk.

Particular stress is being taken on the development of a perfect cross winding which will unwind after all the acid has been washed out. The thread, or threads, lock so that the layers will not spring off when dry. The result is clean silk and a high percentage of grade A material.

This machine is equipped with extra change gears to effect various

Illustrations of Equipment Referred to in Article "Mechanical Development in Rayon Manufacture"



combinations. As a full equipment, gears are supplied to suit conditions for 30 to 450 denier and a rate of spinning of 42 meters per minute, concentration of spinning solution of 4.5% alpha cellulose to 8%.

Spinning Machine—Fig 3: Fig. 3 shows an open power unit. (A) is the bed plate for the motor. (B) and (C) spool sections. Of course, the machine is double sided. (D) is the protruding spool spindle to which the spool spider is attached.

Ten spinning sections constitute a spinning machine consisting of 100 producing spools and 100 change spools. It will be noticed in Fig. 2 that the spinning fixtures are behind the setting bath tank (F). Under each spool is a drip pan to prevent splashing of setting bath, also the drip acid is carried out separately in (H), as it is not desired that the drip acid should flow back into the setting bath. (C) represents a continuous conveyor which supplies new spools and takes off loaded spools direct to the rotary washer (D). (E) shows the double acting intermediate filter press which serves to collect possible dust particles in the solution after the first two filtrations.

In Fig. 2 it will be noticed that under the conveyed spools a lead trough is arranged to catch the drip from the spools.

Lacquered Spool—Fig. 4: Fig. 4 represents an aluminum lacquered spool. The spool is pressed out of a disc and has an ample amount of holes to facilitate washing.

Spinning Fixture—Fig. 5: Fig. 5 represents a sketch of a spinning fixture.

Titering Gear Pump—Fig. 6: Fig. 6 shows a titering gear pump.

Spinning Machine—Fig. 7: Fig. 7 illustrates the spinning machine from a different view in order to show spinning fixtures and how they are constructed in the unit.

Double Acting Filter Press—Fig. 8: As we glance along the spinning machine, we see the double acting filter press (Fig. 8) and the distributor unit.

The viscose also is constantly kept in circulation by means of a special device (not shown in photograph). This device is particularly important where immature solutions are used.

In this photograph (A) represents the conveyor and (B) the edge of the vacuum rotary washer.

Rotary Vacuum Washer—Fig. 9 *and Fig.* 10: Fig. 9 represents the rotary wheel taken out of the lead-lined box. Fig. 10 shows the rotary vacuum washer.

The spools, as conveyed from the spinning machine, are taken off the conveyor and placed onto the arms as illustrated. By vacuum, the wash water is sucked through the layers of silk. The particular features of this type of washer are:

First: Always fresh and clean water is removing the acid.

Second: The spools remain at all times in a horizontal position; thus not permitting deformation of the winding.

It is well known that particularly in spinning viscose silk on bobbins, very troublesome opaque, white spots occur, which tend to weaken the silk and reduce the stretch and tenacity considerably. In other words, the silk "snaps." This is due to firmly adhering carbon bisulphide and sulphur which can only be removed by prolonged washing. But the customary prolonged washing as used in many plants slimes up the thread and makes subsequent unwinding difficult; that is, the fine filatures break to a greater or lesser extent. Of course, the same thing occurs in the pot spinning system.

The Ams rotary vacuum washer is so arranged that after the complete removal of acid, warm water is introduced into the washer which, at a temperature of 63° C., completely removes the CS_2 and the deposited sulphur becomes very soluble in the subsequent desulphurization process. Therefore, silk washed in this manner will be of very uniform tensile strength and of high tenacity, and will have no foul spots. It is not merely a question of quick washing, but a question of proper washing without sliming the filament.

Comparing the spool spinning system with the pot spinning system, there is just this difference — in the pot spinning system, due to centrifugal force, impurities are thrown out to a greater extent than on a spool spinner but this advantage is offset by the fact that the silk is taken off from cheese direct to skeins in a rather too delicate state.

It is also believed that in the pot spinning system, there is one step less. But is this true? If the spool spinning system is properly operated, there are no more steps and less waste than in the pot spinning system.

We will remember that in all other types of spinning equipment, as shown by Fig. 11, the operators have the tendency to pile up loaded and empty spools on the front board (C). It is so inviting. If about 60 g. of silk is wound onto a spool, this will carry about 300-350 grs. of liquid. The effect of even placing the spools temporarily in a vertical position is shown in (B). While this is exaggerated, it shows the effect. Naturally, as all textile men know, this sagging ruins the subsequent unwinding. The entire spinning machine is hooded and properly ventilated. It requires about 10,000-12,000 cubic feet of pure air for each pound of silk produced.

In capacities, the spinning machine is balanced with the washer. The average production capacity of one complete spinning machine is 200 lbs. of rayon of 150 denier per 24 hours. That is if the speed of spinning is only 42 meters per minute. With experienced operators this speed can be increased to 48 or 50 meters per minute.

Two rotary vacuum washers are coupled together; this being done on account of the fact that one washer would not be sufficient if 300 denier rayon is produced, and any spool type spinning machine lends itself very conveniently to any denier.

It is calculated that at least one hour is required to completely remove the acid. The capacity of one complete washing machine is 100 spools, or corresponding with the spinning machine.

The washing machine is constructed of pure aluminum and coated with rubber to prevent any possible discoloration of the silk.

One pound of 150 denier silk requires from 35-40 liters of water.

Many new improved twisting machines are being developed particularly to handle the aluminum perforated spool more efficiently than the present standard equipment.

One of the most serious factors contributing to the difficulties of rayon manufacture by newly established companies has been the lack of standardization in rayon machinery. The chemical basis of this industry is known to many and there is not much trick to producing the fibre on a laboratory scale. The real trouble develops when an attempt is made to translate these laboratory experiments into large scale production. In past years much of the equipment has been built to specification and the services of an experienced technician with a background of commercial success has been essential to any new company. Today there is a gradual development toward standardization in the mechanical end of rayon manufacture and the accompanying article deals with some of the progress made in this direction. Naturally this question is linked up closely with that of the cost of production and it is safe to assume that, with increasing facility for equipping a plant with standard machinery, more and more companies will be successful, competition will become intensified and cost to the consumer will be reduced.

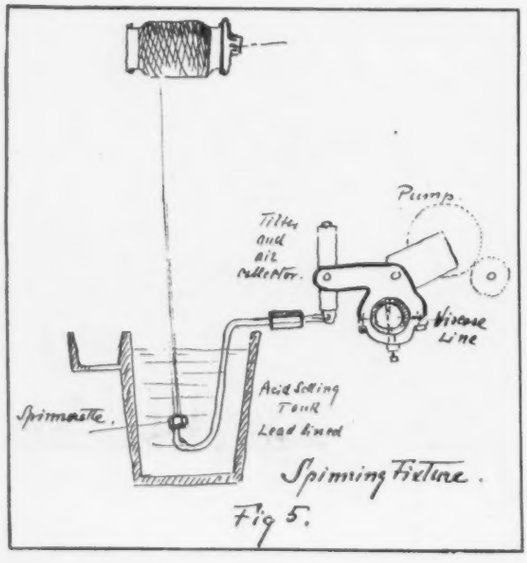


Fig 5.

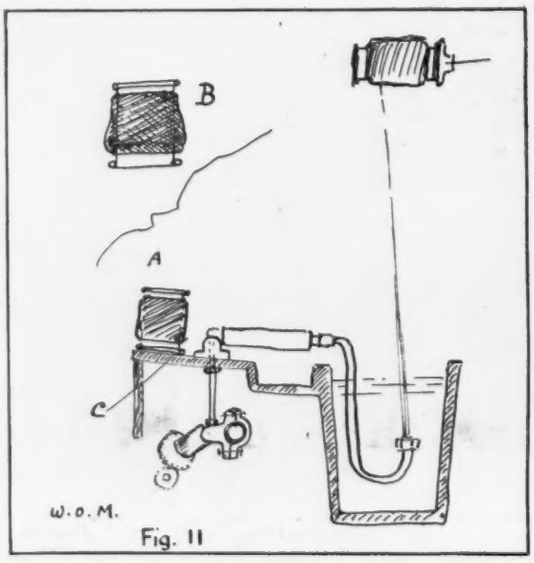


Fig. 11

SECTION II--PLANT DESCRIPTIONS

IN this section appear articles outlining the development and processes of some of the rayon producing companies of the United States. The character and development of the various processes of rayon manufacture may be most accurately and interestingly visualized by a visit to typical plants of each class. In the articles which follow, the reader is given a bird's eye view, by proxy, of the general character of the domestic rayon industry.

Further Expansion for The Viscose Co.

Purchase of Site at Parkersburg, W. Va., for Erection of a 10,000,000 Unit, Marks Latest Increase in Company's Capacity—Pioneer Manufacturer, Producing 320,000 Lbs. in 1911 and Probably 36,000,000 This Year—Brief Description of Viscose Process Employed by Company

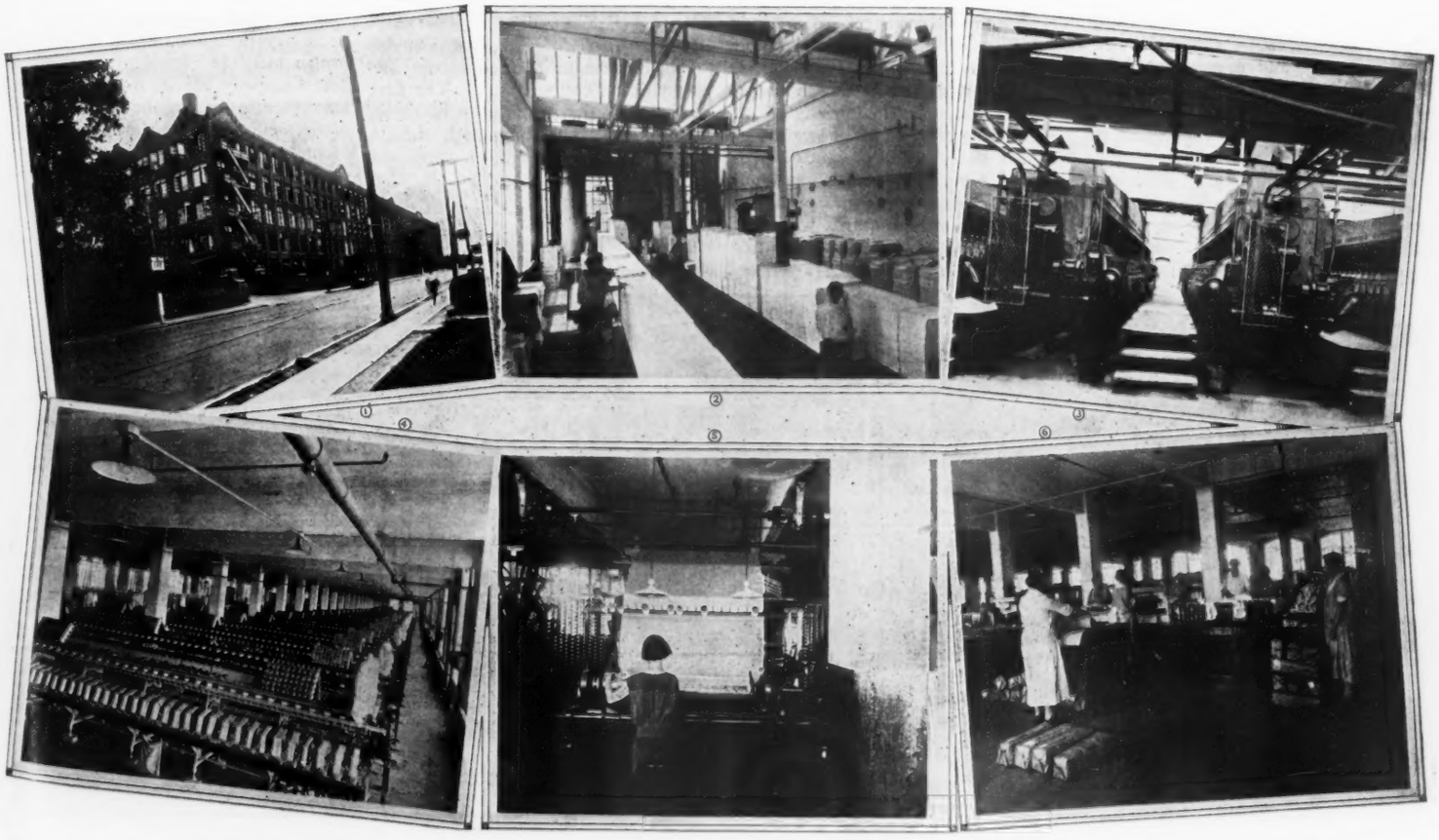
THE recent announcement that The Viscose Co. was to erect another rayon plant at Parkersburg, W. Va., to cost $10,000,000 and to produce 10,000,000 lbs. annually, was of particular interest because it marked further extension of a company which was the pioneer in rayon production in this country and which has maintained its position as the largest producer. The new addition to the company's plant will mean, when completed, a total potential capacity for all its plants of approximately 56,000,000 lbs. per year.

It was in 1911 that this company, then known as The American Viscose Co., started commercial production of what was then called artificial silk. In that year it turned out approximately 320,000 lbs. and in 1912 it produced slightly over 1,000,000 lbs. This output has steadily increased, the most marked advance being of course within the last five years. In 1920, the company produced about 9,000,000 lbs.; last year about 28,000,000 lbs., and this year its total output will probably reach the record amount of 36,000,000 lbs., or about 40% more than the whole world produced in 1914.

It is interesting to look back over the records of the last 15 years and to note that ever since the inception of The Viscose Co., building operations have been consistently underway to increase its manufacturing facilities. The company's main plant is located at Marcus Hook, Pa., but additional units have been constructed successively at Roanoke, Va., (operated by an associated company, The Viscose Co., of Virginia); Lewistown, Pa., and now the prospected plant at Parkersburg, W. Va. In addition, The Viscose Co. has a pulp plant at Nitro, W. Va., where cotton linters pulp is manufactured, as part of the company's production is now on that basis.

Description of Process

A complete description of the method of producing rayon at the plants of The Viscose Co. was published in the 1925 Annual Review and Forecast Number of TEXTILE WORLD, on the



Views at the Viscose Co. Marcus Hook (Pa.) Plant: (1) One of the Plant Buildings. (2) Pulp Board Cutting Department. (3) A View of the Spinning Machines. (4) Spooling Department. (5) Beaming Rayon Warps (on Special Order). (6) Wrapping Rayon for Shipment

basis of the writer's visit to the Marcus Hook plant. In order that this symposium may present a bird's-eye-view of the different processes this description is summarized briefly below.

The raw material, either wood or linter pulp in the form of sheets, is treated for a number of hours with a solution of caustic soda of mercerizing strength. The product of this operation, known as alkali cellulose, is pressed in hydraulic presses and then passed through a mill, or "Pfleiderer," where a series of revolving knives chew up the sheets into small bits. This "crumb" is next conditioned for about 48 hours, during which time the mercerization of the cellulose is completed.

The next operation is the treatment of this "crumb," or finely divided alkali cellulose, with carbon bisulphide in revolving churns—the treatment taking two or three hours. The result is a thio-carbonate of cellulose or cellulose xanthate, resembling wet sulphur in physical form.

This material, which is soluble, is dissolved in a weak solution of caustic soda in a machine with revolving blades. The resulting solution, called Viscose, a liquid of about the consistency of maple syrup, is then "aged" and purified through a series of tanks and filter presses—an extremely important and delicate process.

The problem now is to regenerate the cellulose at exactly the right time and in the form of a lustrous, continuous thread. The Viscose solution is pumped into the spinning room, given a final stage of filtration, and forced through a spinerette, containing a varying number of holes, into a coagulating bath containing sulphuric acid and other chemicals. The acid of course neutralizes the alkali in the Viscose solution and throws the cellulose into a solid, thread form. All the fine filaments from the orifices of one spinerette are caught up into a thread, passed over a glass guide, into a funnel and down a glass tube into a revolving circular "box" where centrifugal force throws the thread against the side of the box, being given a twist of about 2¼ turns per inch en route.

[Another method is to wind the thread directly onto a spool instead of passing into a "box."]

The product, a ring-shaped cake of crude rayon under the "box" method of spinning, is conditioned and passed to reeling machines for transfer into skein form. The rayon is then washed, baked to bring the sulphur to the surface, and passed to the bleach-house where the sulphur is removed chemically and the rayon carefully bleached.

From this point on, the operations are textile in nature. The skeins of rayon are dried, sorted, and transferred on winding machines to cones or tubes, if desired by the customer in that form. However the larger part of the company's output, at the time of the writer's visit to the Marcus Hook plant, was sold in skein form.

Constant Experimentation

This skeleton outline tells only part of the story. It does not include the most important part of rayon manufacture at The Viscose Co.'s plants—the unceasing vigilance necessary in maintaining strengths of solutions, adjusting temperature and pressure conditions in the various operations, and testing the product at each stage to make sure error has not crept in. To carry on this regulatory control, a staff of chemists and engineers, provided with adequate laboratory facilities, is necessary.

In addition, research work is conducted constantly to improve the product and to increase efficiency of production.

Chardonnet Process Basis of Tubize Production

Plant at Hopewell, Va., Employs Method Which Traces Back to Original Discovery of Artificial Silk—Interesting Community—Description of the Nitro-Cellulose Process as Used at the Tubize Plant—Company Started by Belgian Concern

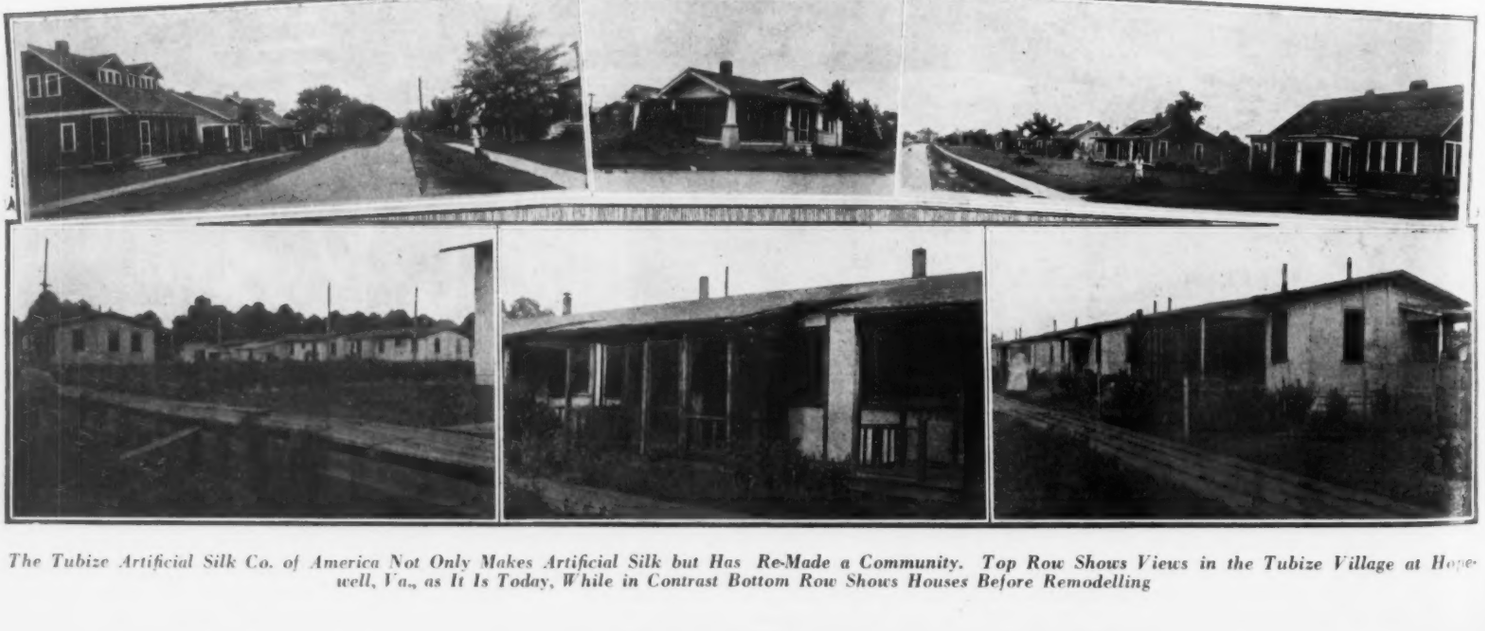
FROM a historical standpoint, the Chardonnet or nitro-cellulose process of manufacturing artificial silk is the most interesting because it is the original method discovered by Count Hilaire de Chardonnet and first patented by him in 1884. It is this process, with of course an infinite number of perfections and improvements, which is the basis of the operations of the Tubize Artificial Silk Co. of America, with plant at Hopewell, Va. Organized in 1920, as an outgrowth of the Fabrique de Soie Artificielle de Tubize, Belgium, this company started production at Hopewell in 1921 and rapidly became one of the important factors in the domestic industry.

Through the courtesy of officials of this company, the writer was able to secure an outline of the operation of this plant during a visit to Hopewell and this is sketched briefly below. It should be emphasized, however, as has been stated in other plant descriptions, that such an outline does not cover the most important phase of artificial silk manufacture, which is the chemical and mechanical control of the various processes involved. This control is the stock-in-trade of the individual companies and represents the difference between successful and unsuccessful artificial silk manufacture.

The raw material used in the Tubize plant is cotton linters. The first operation is the purification of these, which involves boiling with caustic soda and bleaching with chlorine just as is done in raw stock bleaching in the cotton industry.

The next problem is to get this cellulose, or cotton linters, into solution. In the Chardonnet process as employed at Hopewell, this is done by digesting the linters with a mixture of nitric acid and sulphuric acid. The most careful regulatory control is necessary in order to get the exactly proper melange. Incidentally the Tubize Company has its own plants for manufacture of sulphuric acid and nitric acid. The material resulting from this digestion is nitro-cellulose or gun cotton. Thus far the operation is very similar to that employed in explosive manufacture.

This nitro-cellulose must then be



The Tubize Artificial Silk Co. of America Not Only Makes Artificial Silk but Has Re-Made a Community. Top Row Shows Views in the Tubize Village at Hopewell, Va., as It Is Today, While in Contrast Bottom Row Shows Houses Before Remodelling

dissolved. The solvent used is a mixture of ether and alcohol. The alcohol is purchased while the ether is made at the plant from alcohol and sulphuric acid in the usual commercial way. The product from the dissolving of the nitro-cellulose in this mixture is a heavy viscous liquid, which, as one of the officials of the company put it, "flows like a glacier rather than like a river." The solution is really collodion, which is well known as a surgical material and more commonly known as "New Skin."

Having forced the nitro-cellulose into solution, it must now be forced out of solution in the form of a thread. This is done on huge spinning machines, the filaments passing through spinnerettes and being caught up on bobbins. They are then hanked into skeins.

Denitration

Chemically this yarn is still nitro-cellulose. Before it can be offered as Tubize artificial silk, it must be denitrated. To accomplish this, sulphydrate is used. The yarn is then washed and re-wound to the form in which it is to be sold. The bulk of the product of the plant is sold in skeins.

This denitration is of considerable importance as was discovered ruefully in the early days of artificial silk manufacture. Chardonnet's first method involved the nitration of the cellulose but unfortunately material was made of the resulting thread without denitration. The story goes that a woman wore such a dress and came in contact with the lighted end of a cigarette. The result was considerable damage to dress and woman. Consequently a law was passed in France against the manufacture of artificial silk and the promoters found it necessary to develop a method of denitration. This was the first time that the inflammable nature of the material had come to public attention. Today the Tubize product is no more inflammable than cotton since in its reconverted form it is still cellulose.

"Lost Motion"

The same thought has probably occurred to the reader as impressed one of the stockholders of the company who visited the Hopewell plant. "Never in my life have I seen such a place as this for lost motion," he stated. "You do one thing only to undo it the next moment. You put your cellulose into solution and then force it out of solution. You nitrate it and later denitrate it."

This was a logical observation. But the answer is simple. The company starts with cellulose in the form of cotton and its purpose is to finally obtain that cellulose in an entirely different physical form—in fact in the form of a highly lustrous, strong and continuous thread. To do this it is necessary to get it into solution and also to put the cellulose molecule in a chemical combination which will permit this change of form. It is not within our ability or within our province to describe this change. It will suffice to say that the Tubize artificial silk is probably the same chemically as the original cotton but is different physically.

Here is an excellent analogy furnished by one of the members of the company: It is possible to buy from the corner store a piece of dull, dirty resin which is lacking in luster. If this is ground finely, dissolved in alcohol, purified carefully, and then the resulting pure solution spread out on a board, a highly lustrous surface will result. After the alcohol has evaporated, the material on the board is the same chemically as was the original resin but it has changed radically in physical form. Incidentally this probably involves the question of colloidal chemistry which fortunately we do not have to discuss in this brief article.

The Tubize Community

The community of Hopewell, where the Tubize plant is located, is a war town created as a powder manufacturing center during the world war. At that time there were probably over 50,000 people located there. After a reduction from about 30,000 at the end of the war, to 1,500 it has gradually built up in a steady commercial way to a community of approximately 10,000, and of this number, probably 8,000 depend on the Tubize company which employs approximately 3,000 workers.

The chemical plant, where the nitro-cellulose is manufactured, covers a site of approximately 40 acres; the textile plant another 40 acres and the mill community 120 acres. In addition the company has approximately 40 acres for expansion.

Its job in remaking the town of Hopewell to fit its needs is almost as interesting a story as that of the manufacture of its artificial silk. The company owns some 450 houses which have been completely revamped. Tar paper exterior has been replaced by an attractive finish; the houses have been renovated inside, and every possible impetus has been given to the development of individual landscape gardening around the homes. To effect this, the company has enlisted the support of its employes and the work has become a voluntary expression of the community rather than a function engineered by the company. The result is an attractive suburban community of homey-looking dwellings.

One of the features of the community is a club house operated by a stock company and including auditorium, library, lounge-rooms, billiard room, bowling alleys, etc., with tennis courts and a swimming pool on the grounds.

The company has built a baseball diamond for the use of its operatives, but this may be cited as one of the examples of industrial relations as employed at Hopewell. Instead of forcing this amusement upon the employes, the company first secured a guarantee that a certain number of the workers would buy baseball outfits. In other words, the management assured itself that there was a real desire for a diamond before going ahead with it and now the sport has the enthusiastic support of the personnel, as evidenced by the fact that there are eight teams in an inter-departmental league.

This aversion to anything approaching paternalism is apparent in all the company's relations with its employes. Despite the number of workers it employs, it has resisted the temptation to foster any organized machinery of representation, but instead has developed a consciousness among the individual overseers that they are the contact men in industrial relations. They have been successful in this plan and have built up a spirit of interrelationship among departments which is particularly valuable in such a sensitive series of operations as is the manufacture of artificial silk.

The Celanese Development at Amcelle, Md.

American Cellulose & Chemical Mfg. Co. Making Cellulose Acetate Silk, Quite Different from Other Types—An Outgrowth of War Industry in England—Description of This Process as Employed at Amcelle —Development of Special Celanese Dyes a Feature

TO the layman, artificial silk is artificial silk. Or possibly, in view of recent developments, it might be better to say that rayon is rayon. To him, the terms viscose, Chardonnet, cellulose acetate, etc., probably seem rather superfluous.

There is, however, as textile consumers know, a very real difference between individual types. There is a still broader difference between two general classes. On the one hand are the types known as "regenerated cellulose"; on the other is cellulose acetate.

Briefly, this distinction may be expressed as follows: The manufacture of viscose, Chardonnet and cupra-ammonium rayon involves the forcing of cellulose into solution, following in turn by forcing it out of solution, under proper conditions, as a lustrous and continuous thread. In the case of the cellulose acetate variety, however, the procedure is to convert cellulose into one of its compounds—cellulose acetate; to dissolve this product and then to force the compound itself out of solution as a silken thread.

If this distinction is clear, it can be realized that the latter type might be expected to show quite different characteristics from those possessed by the "regenerated cellulose" varieties. These variations are many, but possibly the most important one—from a practical standpoint—is its reaction to dyes. Singularly enough, this particular individuality has been changed from what was popularly regarded as a fault, to a distinct advantage—a selling argument. Not so many years ago, it was quite common to hear: "Cellulose acetate silk looks fine, but I can't use it because it won't dye right." Today it can be dyed with SRA dyes in all shades fast to light, soaping, perspiration and washing and the production of cross-dyed effects on combinations of cellulose-acetate silk with other fibres represents a real contribution to textile art.

The Amcelle Plant

It was the writer's privilege to see the actual manufacture of cellulose acetate silk at the plant of the American Cellulose & Chemical Mfg. Co., Ltd., Amcelle, Md., manufacturers of Celanese.

Celanese is an incidental product of one of Great Britain's war time industries. The British Celanese Co., Spondon, Derby, England, produced during the war cellulose acetate in great quantity for "dope" for airplane wings. At the time, commercial development was not permitted, and it was not until after the armistice that research investigation was initiated for the adjustment of the plant to artificial silk manufacture. The American company was formed at that time but the initial development work was done in England. Early this year the commercial production of Celanese began at Amcelle.

There are two main divisions of manufacture at the plant. One is the chemical plant, where cellulose acetate is produced; the other is the silk plant where this product becomes Celanese. A third division might be termed the textile plant, but this, while complete in its equipment for the manufacture and finishing of knitted and woven Celanese materials, is primarily for experimentation and demonstration.

The Chemical Plant

The raw material at Amcelle is bleached cotton linters. Viscose plants using cotton linters as a base convert

these first into a linter pulp, but in the case of Celanese, the linters themselves are used. They arrive at the plant in bales which are opened up, fed into an opening and willowing machine, through a dryer and then blown to the tanks for the initial chemical operation, known as acetylation. This very first step represents the actual chemical conversion of cellulose into cellulose acetate, and although the resulting product subsequently goes through a series of intricate and important operations during its transfer into the form of a textile fibre, it is now chemically the same as the product sold to textile mills as Celanese.

The acetylating mixture consists of acetic acid, acetic anhydride and a catalyst. (For the information of our non-chemical readers, it might be explained that a catalyst, or catalytic agent, is a material which does not itself enter into the chemical reaction, but whose presence aids the reaction between other materials.) The acetylation process is far more intricate than merely the mixing of cellulose with these chemicals. The factors of temperature, time and proportion of ingredients must each be exactly right. Consequently, throughout the reaction, constant chemical and physical tests of the mixture are necessary. The laboratory staff must continually check the solubility of the resulting product in various solvents; its appearance under a microscope, etc. The cellulose acetate is finally precipitated out of solution in order that it may be purified.

The Silk Plant

The first job in the conversion of this white granular material into a silken thread is to get it into solution. The solvent used is acetone, or any good solvent for acetate of cellulose, and the mixing is done in huge revolving tanks, without pressure. This is another operation where satisfactory results depend upon painstaking laboratory supervision as to temperature, time, etc. The resulting solution is a heavy viscous material, resembling "New Skin," which dries rapidly on exposure to the air. In order to purify the solution, it is then passed through a series of alternating filter presses and settling tanks. Its viscosity makes it necessary to force it through these purification stages under great pressure. After the final stage it is forced up to the top of the spinning machines for its actual conversion into thread.

The spinning machine in the Celanese plant is remarkable. To the onlooker, it appears miraculous. The heavy gummy material is transformed instantly and before his eyes into a fine, lustrous thread. Briefly, here is what happens: The solution of cellulose acetate, as finally purified, is forced into jets through a disc with infinitely fine holes; down the center of the machine in the form of rain, clearly visible through glass panels; caught up at the bottom and wound on spools as Celanese. During that interval, the solvents are removed by an upward current of air forced into the machine.

Final Handling

Here one important fact must be noted. The spools of Celanese as removed from the spinning machine represent a marketable product as such.

Naturally the spools on which the Celanese is wound at the spinning machine are too heavy and expensive for shipment; consequently the product is rewound on to paper tubes. A small part of the product is sold in skein form for subsequent dyeing.

The final step is the inspection of the tubes or skeins—and this is naturally a vital operation. Inspectors are trained with painstaking care.

Demonstration Department

The company is interested not only in the manufacture and sale of Celanese, but in its successful application by textile mills. Consequently it maintains an extensive experimental and demonstration department where it can develop the best methods for handling the product in weaving, knitting and finishing—and can also show its customers actual results which can be obtained.

Looms and knitting machines of various types are operated for this purpose, while the experimental dyehouse is a complete plant for Celanese finishing, including skein dyeing and fabric dyeing machines, pin frames, centrifugals, finishing machines, etc.

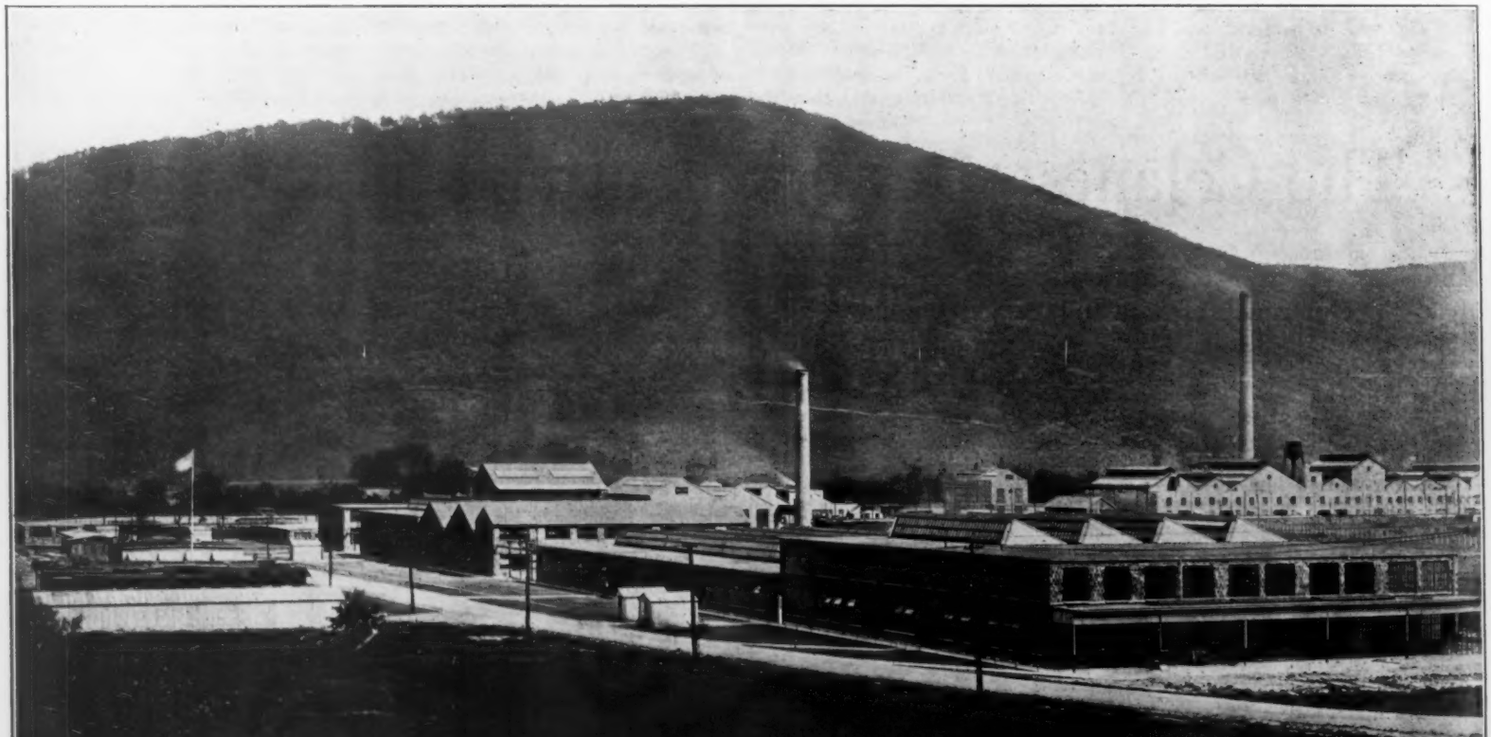
It must be emphasized that these strictly textile operations do not represent a commercial phase of the business. The company has no desire to compete with its customers, but is anxious to see Celanese processed in a manner which will insure the best results.

Incidentally, the question of personnel is one of the main phases of the company's manufacturing program. Operations at Amcelle were started with a nucleus of skilled technical workers from England, but the company has developed gradually a staff of American operatives who are trained to the various processes.

In its personnel supervision, the organization has maintained a plant cafeteria, a model first-aid station—and other features which make for the best working conditions. In addition, 20 houses are owned by the company in Cumberland and rented to employes, while a few large farm houses are maintained near Amcelle.

Extent of Plant

The Amcelle plant, situated in a beautiful mountain region, comprises 730 acres of land; a group of new, modern buildings; a filtration plant with a capacity of 4,000,000 gallons of water per day; and a water softening plant capable of delivering 500,000 gallons daily to the dyehouse. The town of Amcelle represents the crea-



Plant of American Cellulose & Chemical Mfg. Co., Ltd., at Amcelle, Md.

tion of a community by the company.

Summing up this sketchy outline of a complicated process, it might be stated that the impressions which strike the visitor most forcefully are the remarkable continuity with which processes are scheduled and the extremely involved research and control methods necessary for scientific regulation of the product through its different stages.

Uses of Celanese

Finally it is interesting to quote an official of the company on the qualities of Celanese and its dyeing with SRA dyes produced by the company:

"Celanese yarn enters nearly every textile industry. For example, fabrics from the heaviest satins and most elaborate of drapery materials down to the sheerest chiffons are made from 100% Celanese, dyed to fast colors by the SRA dyes. The dyeing of Celanese with SRA dyes is just as simple as the dyeing of any other fibre and the colors are fast to sunlight, washing, perspiration, etc. This ease of good dyeing is particularly interesting in view of the old story that Celanese is difficult to dye.

"Weavers find that the uniform size of Celanese yarn is of decided advantage to them in the production of all kinds of fabrics which, after dyeing, remain absolutely unmarred by the streakiness that results from the use of uneven deniers. Due to the high elasticity and elongation of Celanese, weavers are getting less waste, or, so to say, no waste, and more production per loom.

"The cross-dyeing possibitities when Celanese is used in combination with other yarns have long been appreciated in the industry, but of late manufacturers have been turning their particular attention to the production of fabrics in which Celanese is used both in the warp as well as in the filling.

"There is a very large demand for Celanese fabrics for the underwear trade owing to the fact that not only does Celanese wash well, but that it actually improves with washing, and white Celanese fabrics remain white and do not become yellow or discolored.

"The qualities of fabrics and garments made from Celanese have the soft drape and silkiness of silk and, to the lay mind, it is difficult to believe they are not silk.

"When one realizes that Celanese garments are excellent insulators, that they are cool in summer and warm in winter, that they stand immersion in sea water indefinitely without deterioration, that they do not absorb perspiration or humidity beyond 5% and are therefore chill-proof, and that they are transparent to the health-giving ultra violet rays of sunlight, thereby receiving all the curative and beneficial effects of the sunlight, there can be no doubt that Celanese has a place all its own on the textile markets and in the electrical industry."

Du Pont Rayon Co. Old Hickory Plant in Operation

One Unit in Full Production—Second Unit Will Be in Operation Next Year, Bringing Total For Tennessee Plant to About 10,000,000 Lbs. Per Year—Extensive Community Developed by the Company—Original Plant is at Buffalo, N. Y.

ONE of the important additions to the rayon industry during the year 1925 was the operation started at Old Hickory, Tenn., by the Du Pont Rayon Co., whose original plant is at Buffalo, N. Y. This company purchased in 1923 the village at Old Hickory, Davidson County, Tenn., and approximately 750 acres of ground for plant purposes. The village is about 15 miles from the city of Nashville, on the Cumberland River. It was laid out and built during the war as part of the operations of the Old Hickory powder plant.

The village itself consists of approximately 1500 houses of ten to a dozen different types ranging from six-room bungalows all the way up to the most attractive type of modern houses for the plant officials. The village is very attractively laid out, with wide streets well paved, and furnished with all the conveniences of larger cities. Water, electricity, etc., are furnished by the Du Pont Rayon Co. The village is equipped with full and efficient fire service, a uniformed police force and all other necessary facilities.

The community center of the village is equipped with stores of various kinds which are operated entirely independently and by outside tenants. The usual other public facilities, such as United States post office, telegraph and telephone operations, are also conducted through the regular channels. Resident doctors and dentists will look after the welfare of the community.

Recreation Facilities

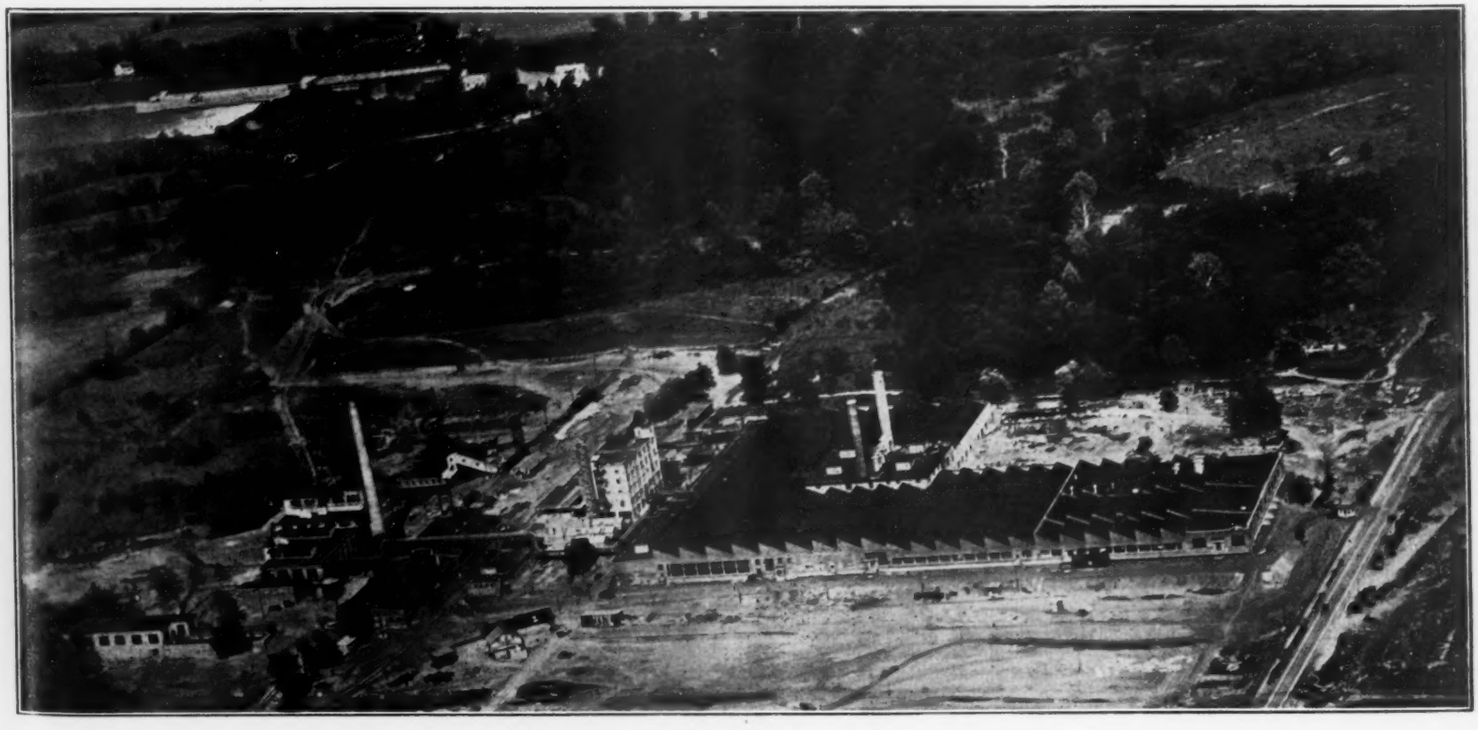
The recreation facilities are exceptionally well taken care of, there being two large community buildings, one for men and one for women. The men's clubhouse contains bowling alleys, billiard tables, basket ball equipment, moving picture apparatus, dance floor, etc. The women's clubhouse is most attractive, has a large dance floor, a stage for amateur theatricals, and basket ball equipment, as well as meeting rooms, etc.

There is a nine hole golf course which is owned by the company, as well as tennis courts, baseball diamonds, etc.

The entire land and village are owned by the company and operated by them on very free and liberal lines. No company stores of any kind are operated nor are any restrictive regulations other than the common necessary ones enforced.

Extent of Unit

The rayon unit which is now in



Plant of Du Pont Rayon Co. at Old Hickory, Tenn.

Portion of Old Hickory Village, Du Pont Rayon Co.

full operation is producing at the rate of four to five million pounds per annum, of viscose rayon. The plant itself is entirely modern and new, none of the old powder factories being used. Every effort has been made to make the working conditions the very best that the state of the art and money could furnish. The plant itself is of one story construction, saw tooth, and exceptionally well lighted and ventilated and with ample room for all operations.

The company has under construction at the present time and is expected will be starting to operate by Jan. 1, 1926, a duplicate of the unit which is now running, so that the total production of the two units for 1926 will be at the rate of from eight to ten million pounds of viscose rayon per year.

It is expected that when both operations are in full volume, early in 1926, the population of the Old Hickory village will be between six and eight thousand people. The accompanying photographs give some idea of the construction of the plants, as well as the views of the village.

Organized in 1920

The Du Pont Rayon Co. was organized in 1920 and was then known as the Du Pont Fibersilk Co. It represented a merging arrangement between E. I. du Pont de Nemours & Co. and the Comptoir des Textiles Artificials of Paris, France. French viscose patents, controlled by the latter firm, were thus placed at the disposal of the new company, which operates by that method. A plant was constructed at Buffalo, N. Y., with an initial capacity of 1,500,000 lbs. per year. This has been increased steadily so that, with the two plants in operation, the company will produce between 12,000,000 and 15,000,000 lbs. in 1926, depending upon the denier.

Important Changes in Industrial Fibre Corp.

Organization of Industrial Rayon Corp. to Acquire Italian Interests was Accompanied by Decision to Expand Output of Company—Will Be on Basis of 3,500,000 Lbs. by End of Year—Operates Under Viscose Process by Spool Method

An event which involved one of the companies which was organized during the beginning of the current rayon impetus was the recent incorporation of the Industrial Rayon Corp. to acquire the Italian interests in the Industrial Fibre Corp. of America. The latter company was formed in 1920, as a result of a merger between the American Borvisk Co., of Cleveland, O., and the Societa Navigazione Industrie Commercio Snia, of Italy, more commonly known as "Snia Viscosa."

This arrangement made possible the manufacture of rayon under Italian viscose patents. The plant established at Cleveland by the American Borvisk Co. was utilized as a nucleus but the Borvisk method, which had been under experiment for some time, was discarded. The company uses wood pulp as a base and employs the spool method of spinning.

Widespread interest was aroused by the announcement that the Snia Viscosa interests in the company, amounting to two-thirds of the common stock, had been purchased by Americans identified with the company and transferred to the newly-formed Industrial Rayon Corp. Stockholders

Plant of Industrial Fibre Corp. of America, Cleveland, Ohio

in the Industrial Fibre Corp. of America ratified this arrangement at a special meeting and were given the opportunity to purchase part of these acquired interests at $5.24 a share, in a proportion of 66 shares for every 100 held. In addition, it was decided to make a trading basis of two shares of Industrial Fibre stock for one of Industrial Rayon, thus providing for a reserve in the treasury for further expansion. It is expected that ultimately the Industrial Rayon Corp., will hold all the stock of the Industrial Fibre Corp. of America.

Of even greater interest was the announcement that plans for further expansion were under way. The plant will be on a basis of 3,500,000 lbs. by the end of the year and it is understood that additional increase in capacity will be made in the future.

The new arrangement provides that both the American and Italian interests are entitled to use the patents employed by the company independently and also to utilize the experience and research development realized at Cleveland up to the time of the acquisition of the Italian stock by the Industrial Rayon Corp.

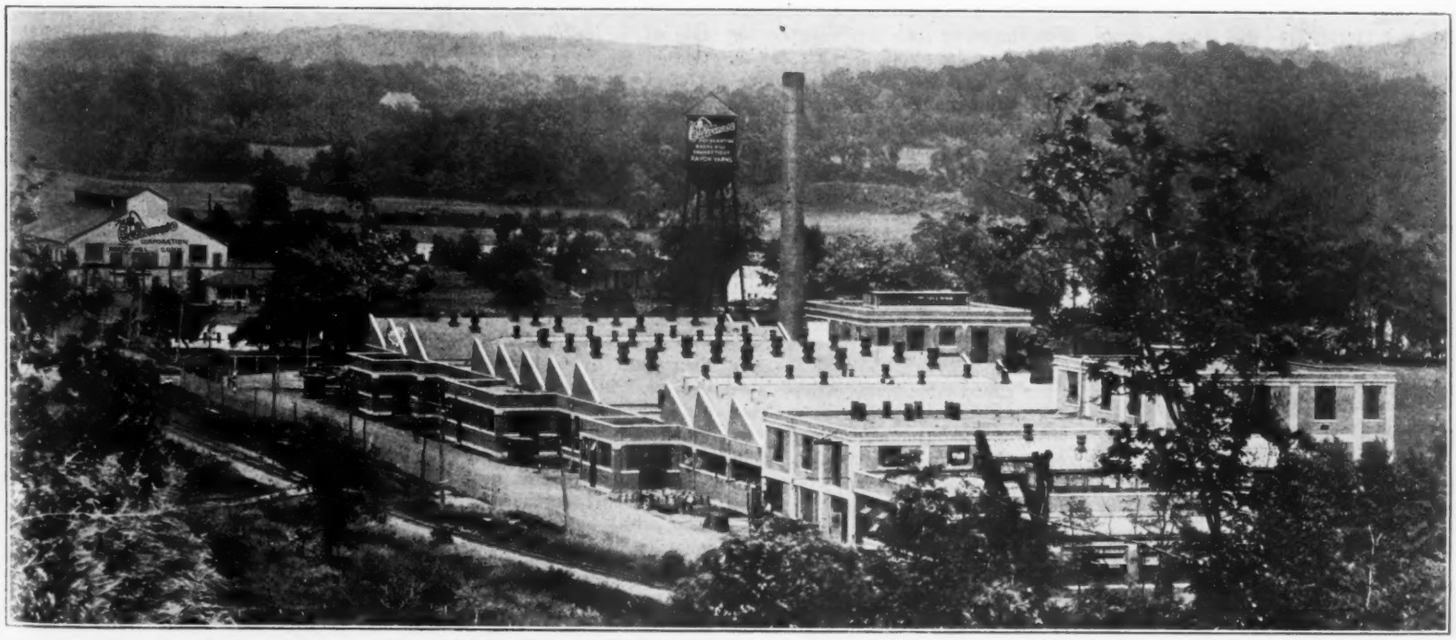
In addition to interest shown by financial circles in the new development, the event was of particular conce n to the rayon consuming industries as it marked further expansion for one of the established and successful rayon producing firms.

Belamose Corp. Reaches Commercial Production

Now on a Basis of 3,000 Lbs. Per Day—Will Produce 1,000,000 to 1,500,000 Lbs. in 1926—Operates Under Viscose Process, with Special Improvements Developed by the Company

ONE of the domestic rayon producing companies which has reached commercial production this year and which now falls in the rank of successful factors is the Belamose Corp., with plant at Rocky Hill, Conn., and principal offices at Hartford, Conn.

This corporation was organized early in 1923 under the laws of the State of New Jersey and later was incorporated in Connecticut. Its authorized capitalization when the latter articles of incorporation were taken out was $2,000,000, of which more than half was paid in. The company proceeded immediately with the erection of a plant and at once, upon completion of construction work, with the production of rayon. The



Plant of Belamose Corp. at Rocky Hill, Conn.

basic process employed is viscose.

Productive Status

During the first six months of this year, the company reached a productive basis of approximately 2,000 lbs. per day. It is now on a basis which will make its total output for the last six months of this year approximately 500,000 lbs. In 1926 its production will probably total 1,000,000 to 1,500,000 lbs.

The plant investment alone represents over $600,000. The main building is 600 x 230 ft., brick, partly three-story and the major portion one story high with saw-tooth roof, and modern construction in every particular.

In the spring it was announced that N. B. Kneass Brooks, Boston, New York and Philadelphia, had been appointed sole selling agents for the product of the Belamose Corp.

Acme Artificial Silk Co. Increasing Output

Is Now on Successful Commercial Basis—Developed Its Manufacturing Program Through Years of Experimental Work—Operates Under Viscose Process—Output in 1926 Will Approximate 600,000 Lbs.—Planning to Erect New Plant Building

ONE of the domestic rayon plants which has tackled the problem of manufacturing this difficult fibre consistently and persistently over a period of years and which has succeeded in attaining commercial production is The Acme Artificial Silk Co., of Cleveland, Ohio. In fact this plant may be cited as an example of those companies which have regarded rayon manufacture as a manufacturing problem rather than a financial problem. They have kept everlastingly at it, without seeking or desiring publicity and consequently their ultimate success is all the more noteworthy.

Organized in December, 1920, with a capital of $500,000 preferred and 10,000 shares of no par common stock, The Acme Artificial Silk Co. was an offshoot of The Cleveland Art Silk Co., which in turn was a successor of The American Silk Fibre Co. of Cleveland. The latter firm was incorporated about 28 years ago and, after exhausting its funds, was succeeded by The Cleveland Art Silk Co.

C. P. Green, who organized The Acme Artificial Silk Co. and who is at present its treasurer and general manager, was president of The Cleveland Art Silk Co. during its existence of about 12 years, at the end of which time he purchased its assets for The Acme Woolen-Cotton Mills Co. of Cleveland. Charles A. Huttinger, who finally perfected the company's process, was at that time associated with Mr. Green as vice-president and superintendent of The Acme Woolen-Cotton Mills Co.

The latter company built a small unit and manufactured artificial silk for a year or two before selling its woolen and cotton machinery and giving its entire efforts to the artificial silk business. The company waited until patents that had been applied for were granted before organizing The Acme Artificial Silk Co. Up to that time nearly $1,000,000 had been spent by Mr. Green and his associates.

Even after the organization of the new company, progress was not easy. It took about two years for The Acme Artificial Silk Co. to build machinery and get into production. Finally when everything appeared to be perfected, further difficulties and losses developed for still another year. About two years ago, however, these obstacles were overcome and since then the company has been earning consistent profits which have increased steadily with increased production.

Productive Status

Last year, the company produced 252,696 lbs. of rayon. During the first six months of this year it produced 146,962 lbs. It expects to manufacture approximately 175,000 lbs. during the last six months of the year and for 1926 its output will probably reach a total of 600,000 lbs.

Thus far the company has been utilizing the buildings of the former Acme Woolen-Cotton Mills Co., but plans are now being prepared for a new building and new machinery is being built.

Under Viscose Process

Its predecessors, The American Silk Fibre Co., and The Cleveland Art Silk Co., confined their efforts to the cupro-ammonium process, and after the Acme Woolen-Cotton Mills Co. bought out The Cleveland Art Silk Co., it perfected that process. Later, however, it decided to change over to the Viscose process and The Acme Artificial Silk Co., has been operating under this method ever since it was organized.

Incidentally the company is in favor of the term "rayon" for artificial silk and considers it very well fitted for a distinctive name for the product.

Bemberg to Use Cupro-Ammonium Process

American Bemberg Corp. Constructing Plant at Johnson City, Tenn.—Represents Merger of German Interests—Will Start With Output of 7,000 Lbs. Per Day—Means Large-Scale Production in this Country Under Fourth Major Process

ALTHOUGH the cupro-ammonium process has been employed in this country in the past, the output of plants operating under this method has not been sufficiently large to represent an important commercial factor. Consequently the announcement that this process would be the basis of manufacture of an extensive plant projected for the South aroused decided interest among the consuming trades as it meant the commercial utilization in this country of the fourth major process. With the beginning of operation of this plant, all four methods will be in large-scale use here.

The company concerned is the American Bemberg Corp., organized recently as the result of a merger between important German interests, namely J. P. Bemberg, Ltd., of Barmen, Germany, and the Vereinigte Glanzstoff-Fabriken, of Elberfeld, Germany. The former produces cupro-ammonium silk which is sold under the name of Bemberg and has been imported into this country for some years by Wolf, Strauss & Co., New York. The Vereinigte organization manufactures extensively under the viscose process. However, the new American company will employ the Bemberg method.

The site chosen for the plant is located between Johnson City and Elizabethton, Tenn. Construction has started and it is stated that operation will begin in June. The initial capacity is to be 7,000 lbs. per day.

Outline of Process

The cupro-ammonium process dates back to about 1900 when it was patented by a man named Bronnert. It has had its major development in Germany.

Artificial silk produced by this method falls in the "regenerated cellulose" class. Its manufacture involves the dissolving of cellulose, usually in the form of cotton linters but sometimes as wood pulp, in an ammoniacal solution of copper and the regeneration of the cellulose from this solution in the form of a thread.

The common method of obtaining a copper solution of this type is to dissolve copper turnings in aqua ammonia (ammonium hydroxide), aiding the dissolving by passage of a current of air through the mixture. The cellulose, previously purified and sometimes mercerized, is treated with this solution for several hours at a temperature of approximately 40° F. The resulting solution is blue and viscous. It is purified by filtering and then spun by a method similar to that used in the nitro-cellulose process. The coagulating bath into which the spinning fluid passes from the spinerettes generally contains sulphuric acid. This neutralizes the ammonia and regenerates the cellulose, with, however, copper as an impurity.

In the washing and purification stages which follow, the copper is removed completely and the filaments of artificial silk are bleached.

Both the copper and the ammonia are recovered for subsequent use. This recovery is of great importance if the material is to be manufactured economically. It is stated that the American Bemberg Corp. will utilize an inexpensive and efficient method of ammonia recovery recently perfected by the Bemberg organization in Germany.

One of the outstanding features of manufacture under this process has been the production of exceedingly fine filaments. It is understood that as many as 98 filaments per thread have been used in Germany. However, the tendency has been to go well below this number for general commercial use as the breaking strength of such very fine filaments has not been sufficient to withstand mechanical handling without damage. Partly due to the fineness of the filaments and partly to the chemical process itself, the cupro-ammonium product is not as highly lustrous as other varieties and is regarded by the trade as more nearly resembling real silk.

SECTION III--USES OF RAYON

ONE of the most important considerations in any treatment of the rayon situation is the question of the extent to which this material enters the different branches of the textile industry. The market editors of TEXTILE WORLD have prepared the following series of articles covering this vital phase of the subject. Each editor, through his intimate acquaintance with the market which he reports week by week, is in a position to analyze in detail the part which rayon has played in developments in his particular branch of the industry. The symposium represents an authoritative and timely contribution.

Knit Goods Industry Pioneer Rayon Consumer

Hosiery Mills Take More than Any Other Branch—Quantity Use in Full-Fashioned Predicted—Utilization in Underwear, Especially Women's, Expanding Constantly—Outerwear Important Consumer but Affected by Recent Style Changes

By Louis R. Keeffe

KNIT goods manufacturers were the first branch of the textile industry in this country to sponsor in a sizable way rayon, or artificial silk. They did not wait for the new fibre to be dignified with a new and entirely different generic name, placing it on a par, in nomenclature, with cotton and wool, but quickly adopted artificial silk as a new yarn which added beauty and saleability to their merchandise.

Rayon has been fortunate in making its real entrance on the merchandising stage in the United States during a period of years in which the public taste was making tremendously rapid strides and when there were radical style changes. During the last ten years especially this trend has been very noticeable. Consumer interest in better merchandise has been constantly expanding.

Many women who were satisfied with a cotton or mercerized stocking a comparatively few years ago will have none of it today; the same principle is true in regard to underwear and outerwear—and all other classes of apparel, for that matter.

This, then, is the basis upon which the amazing success of rayon has been built. Other influences, and important ones, there are in abundance, but the real story of rayon must be written around the fact that mass ideas on merchandise have been raised to a standard never before seen in this country.

Hosiery Mills Largest Users

As the largest division of the knitting industry, hosiery naturally occupies the position of the largest consumer of rayon in that industry. In addition to that, however, hosiery manufacturers are far and away the best customers of rayon houses. They provide the largest single outlet for the new fibre, and while other trades, particularly cotton goods, loom up as possible eventual competitors for premier position, it is a safe prediction to make that the hosiery trade will continue to consume more artificial silk annually than any other part of the textile industry for some years to come.

Accurate statistics on the percentage of the total production of rayon in this country going to various classes of consumers are impossible to obtain. An idea of the leadership of hosiery may be gained, however, from the fact that a large domestic producer of rayon estimated that 20% of his total 1924 production was consumed by hosiery manufacturers.

1923 Census Figures

The 1923 census figures showed a total production of all classes of hosiery during that year in this country of 97,432,927 dozen pairs, valued at $378,732,878, gains of 21.4% and 30.4% respectively over the figures reported in the 1921 census. The following classifications give some idea, though an incomplete one, of the importance of artificial goods in that total:

Hose	1923	1921	% of Increase
All artificial silk			
Full fashioned (doz. prs)	5,840	46,171	-87.4
Value	$34,500	$465,947	-92.6
Seamless (doz. prs)	2,161,394	1,549,817	39.5
Value	$8,354,092	$5,155,720	62.0
Natural or artificial silk mixed with other fibres			
Full fashioned (doz. prs)	6,039,006	4,797,464	25.9
Value	$88,113,464	$64,261,509	37.1
Seamless (doz. prs)	9,613,510	9,104,801	5.6
Value	$56,409,255	$43,366,386	30.1
Half Hose			
All artificial silk			
Seamless (doz. prs)	591,223	451,214	31.0
Value	$2,258,177	$1,445,606	56.2
Natural or artificial silk mixed with other fibres			
Full fashioned (doz. prs)	819,323	615,810	33.0
Value	$6,296,732	$3,384,686	86.0
Seamless (doz. prs)	6,874,972	2,669,743	157.5
Value	$31,882,894	$8,644,932	268.8

Starting with the hesitant experimentation which always characterizes the adoption of anything new, hosiery mills rapidly mastered the correct manipulation of rayon. It is no reflection on rayon for weaving purposes to say that it is a fibre which is ideally suited for the knitting machine.

Today a very large percentage of the total number of dozen pairs of hosiery manufactured in the United States is made up in whole or in part of what the trade usually refers to as "fibre." Exact figures on combination yarn goods is impossible, as indicated in the above table.

The ready adaptability of rayon to combination with other yarns has been largely responsible for its popularity with the manufacturer. It has given him something to work with. It has supplied an aggressive and progressive industry a new tool with which to express itself.

Many of the latest styles of the novelty half hose which have been so popular this year are an intricate combination of nearly all the textile fibres, a combination which frequently defies short description.

Silk and Rayon Mixtures

Perhaps the largest single class of hosiery in which rayon has been employed is the variety of merchandise which is listed under the general heading of silk and fibre mixtures. A big market has been built up in women's hosiery for both plaited and twisted goods. Good mills have been turning out for some time silk and rayon seamless goods, in both twists and silk plaited over rayons, which defy detection, on casual examination, as not all-silk stockings. From every standpoint of appearance and wear, it is claimed that they should rank with all-silk merchandise.

The large business built up on this type of hosiery, together with the low prices at which silk full-fashioned hosiery has been offered, has sounded the death knell for the all-silk seamless stocking for women as a volume proposition, in the opinion of not a few capable observers.

Women's All-Rayon Hosiery

All-rayon hosiery for women has made rapid progress within recent years, in export as well as domestic business. Extremely creditable merchandise to retail in the neighborhood of 50c has been turned out by a number of representative mills. Satisfactory wearing qualities for these goods have been demonstrated too often to make that point worthy of any extended discussion here. Proper care in washing gives to the all-rayon stocking as long a life as is desired by the ladies these days.

This type of hosiery, with some of the cheaper mixtures of silk and rayon, has been chiefly responsible for the eclipse of the mercerized stocking as a big volume number. There will always be good mercerized stockings, of course, and they will always find a market, but the days of the mercerized volume of, say, five years ago, seem gone for good.

Full-Fashioned Predictions

Before leaving the question of women's hosiery it is fitting here to throw in a little prophecy regarding the development of the use of rayon in the full-fashioned field. The number of full-fashioned mills which are now using rayon, alone or in combination with real silk, in the production of goods for the market, is very small. A few mills have built up fair volume on numbers of this character, but generally speaking the employment of rayon in full-fashioned hosiery has not yet made even a respectable beginning; a decided decline in all-rayon production from 1921 to

1923 is shown by the census figures printed above.

If it were not for the unprecedented strength of the full-fashioned market during all of this year, another story might be written. Important full-fashioned mills, among them the largest individual producer in the country, were experimenting with the use of rayon in their product, in combination with Japan silk, last year.

The official reason why nothing ever came of these experiments so far as real production is concerned was that "the fibre is not yet good enough for our purposes." The real reason is probably somewhat nearer to the fact that there is little incentive to bring out something new when the established silk production is selling like hot cakes.

Large full-fashioned manufacturers undoubtedly feel that to employ rayon in large quantities would be a step in the wrong direction. They unquestionably have a sincere desire to maintain the quality reputation of full-fashioned goods. But it is none the less true that the quantity production of rayon combinations in full-fashioned hosiery is as definitely predictable as anything is in the hosiery business.

Far-sighted hosiery men look forward to the time, not so far in the future now, when there will be a very real place in the market for all-rayon full-fashioned hosiery for women.

Half Hose

In half hose the largest use of rayon thus far has probably been in rayon-plaited over mercerized goods, and in the twists and plaited combinations which make up the novelty hose of today. The all-fibre sock has had its day, and will probably have it again, but it is not likely to equal in popularity the all-fibre goods for women.

Silk and rayon twisted numbers in half hose occupy an important position, as do silk plaited over rayon goods. A very large business has been done for this fall by southern mills on a cheap fibre plaited, drop-stitch number, going to the jobbing trade at $1.85.

Combinations of rayon and wool, in half hose and in women's goods, naturally take a leading position in the sports field. Wool goods in the half hose business is now a very broad term which includes all manner of yarn combinations, in which rayon usually plays an important part. The only likely popularity for novelties in women's hosiery within the immediate future is in sports stockings which employ rayon to a large extent for their pattern and color effects.

Infants' Socks Revolutionized

Perhaps the most striking illustration of the rapid rise of rayon in hosiery is the situation in infants' socks. This business has been revolutionized, practically within the last three years, by the new fibre. It has been converted almost over-night, as market developments go, from a mercerized to a rayon business.

It is the infants' sock made of rayon which is selling today. The mercerized numbers have taken a seat so far in the rear that they can scarcely be given a passing thought.

Accompanying this development has been a striking revision in styling. The infants' sock of today is no more like the infants' sock of five years ago than the men's felt hat of today resembles the high silk hat of yesteryear. New color combinations, stripes, checks and plaids in the legs, fancy tops of a large variety, have all accompanied the introduction of rayon into this important branch of the children's business. It is not too much to say that they have been stimulated almost entirely by the use of rayon.

Popular in Children's Goods

Hand-in-hand with infants' socks go the seven-eighths lengths for children which have made so important a place for themselves as now to be classed as staples. The sales-appeal of much of this class of merchandise rests on the attractiveness of the fancy tops, and this, in turn, depends largely on capable use of rayon.

Some of the best numbers made in the various tuck stitches, which have been so popular this spring in children's hosiery, owed their popularity to the attractiveness given them by plaiting rayon over mercerized.

So much for hosiery. It should be emphasized again that the very large importance of rayon in this branch of the knitting industry, as in others, is due to the fact that its use has enabled the manufacturer to improve the appearance of his goods, to improve their styling, to make them more attractive in the eyes of the consumer, and to cater to the highly commendable and growing demand for better merchandise generally.

Use in Underwear Expanding

A NOTABLE development in the use of rayon in the knitting field has been rapid expansion of the market for women's rayon underwear. A comparatively recent development, so far as volume production is concerned, women's rayon underwear appears to be still in its infancy, and the possibilities for the future in the business are considered to be tremendous.

Rayon has been used for years, of course, as trim on cotton underwear for men, women and children. It adds a finishing touch to many of the cheaper lines of men's cotton heavy-weight garments, and rayon ribbons have for years been employed largely in women's goods.

Rayon Stripes for Men

An extremely interesting merchandising experiment is now being conducted through the use of circular rayon stripes on a number of lines of men's flat knitted cotton union suits. Encouraged by the success which has been achieved by rayon stripes in cut-and-sewed underwear, a number of manufacturers of balbriggans for men offered this summer for the first time new and attractive lines of rayon-striped bals.

The majority of these goods are being shown in plain white, but at least one mill is offering rayon-striped underwear in several attractive pastel shades. In this way the balbriggan manufacturer is trying to meet the ever-increasing competition of the nainsook type of underwear. The necessity for injecting some kind of style appeal in balbriggans has been recognized for some time, and manufacturers are relying largely upon rayon for this style appeal.

It is still too early to make definite predictions regarding the likely success of the attempt. One of the first mills in the light-weight field to offer goods of this character, about a year ago, found its initial orders light but the duplicate business fairly satisfactory. On the large number of lines now offered jobbers have sampled cautiously; the consumer's reaction to rayon-stripes in balbriggans, reflected in jobbers' re-order business, will tell the real story.

All-Rayon Suit for Men

In this connection it is interesting to note that good business has been done by a relatively few underwear mills on men's heavy-weight cotton ribbed underwear with rayon stripes. In one or two cases at the present time it is understood that jobbers are having difficulty in getting the delivery they want on duplicate orders for these goods, which indicates the existence of a considerable market still largely undeveloped.

Perhaps the most interesting experiment yet made with rayon in the underwear field is the offering this summer of an all-rayon knitted athletic union suit for men, for next spring. This is admitted to be nothing more than an experiment; it is not believed likely that any volume business can be built up on all-rayon underwear for men, at least not in the near future, and the possibilities for this garment seem confined to small production for the better class specialty store trade. The fact that such a garment is being shown by a representative manufacturer, however, indicates the great interest of progressive mills in utilizing rayon to the fullest extent.

Women's Market Big

The big market, present and future, for rayon in underwear is, of course, in women's goods. The rapidity with which the business has grown to date has been little short of amazing, but its growth has unfortunately not been altogether free from unpleasant circumstances.

Well made rayon vests, bloomers, step-ins, etc. possess much of the appearance and feel of real silk garments. This of course, is their big sales appeal for the women who will not wear cotton and who do not like to pay real silk prices.

It was probably natural under the circumstances that a good deal of misrepresentation of women's rayon underwear should have been done. Much of this was unintentional, but some, unfortunately, was deliberate. The success of a number of the direct-to-consumer sellers in the last year or two has been based upon the large business they have received on rayon underwear. The sales forces of many of these concerns took the easiest road and talked about their "special silk" underwear; the consequence often was a black eye for rayon garments.

Coupled with irregular merchandising has been a certain amount of similarly irregular manufacturing methods. It has been a simple thing for small and inexperienced companies to get into the field, buying their fabrics from a specialty knitter and making up their garments as cheaply as possible.

Some Trade Abuses

This induced for a while a period of competition in which quality standards seemed altogether abandoned. Every effort was seemingly made to turn out cheaper and cheaper merchandise, with the natural result that much of this production was worthless and was repudiated by the consumer.

Happily this condition seems to have passed, or at least to be passing. Representative manufacturers have recognized the futility of engaging in competition which almost entirely disregards quality and are confining their present efforts to the production of really serviceable underwear. Mills which considered the production of good fabrics a simple matter have learned better, and some of them have gone out of the business, at least temporarily.

Outerwear Important Rayon User

MANUFACTURERS of knitted outerwear of all kinds have given generous recognition to the value of rayon. It has been used freely for decorative purposes on a large variety of merchandise which comes under the general heading of knitted outerwear, and attractive garments knitted entirely of rayon have proved big sellers at various times within recent years.

When at the height of its popularity this branch of the knitting industry has been a customer for rayon manufacturers ranking second only to hosiery. Largely a style proposition, however, knitted outerwear is susceptible to more rapid and more drastic fluctuations in popular favor than either hosiery or underwear. It has been unfortunately true that during approximately the last year and a half, novelty sweaters for women, the largest individual user of rayon in the outerwear industry, have been suffering from a temporary eclipse in style.

No real reason exists why this should be so, and there is no explana-

tion for it other than the whims of women's taste. Severe depression in the women's novelty sweater market has had a natural influence on the quantity of rayon used by sweater manufacturers, but the loss in this direction has been more than made up in others.

The return of the sweater to popular favor as a style proposition for women can be no more definitely predicted than can any other vagary of Dame Fashion, but the style cycle will unquestionably swing back within the next few years, providing the rayon manufacturer with an even larger outlet in this section of the industry than ever before.

Balbriggan Dress Possibilities

Women's novelty sweaters made entirely of rayon did fairly well in sections this spring. The use of the fibre in combination with other yarns, usually worsted, is very large during normal times. Many of the most attractive pattern and color effects in sweaters and in knitted fabrics for dress purposes are achieved through the capable manipulation of rayon.

An interesting possibility for rayon is held out in the current large demand for balbriggan fabrics for dresses. At this writing the balbriggan dress promises to develop into a style vogue of major proportions, and artificial silk may logically be expected to contribute to its success. Worsted and rayon combinations in balbriggan fabrics are making their appearance in constantly increasing numbers, rayon lending a touch of life which is absent in the usual worsted and cotton combinations.

Technical men make the point that worsted and rayon combinations are not really balbriggans at all, but this is beside the point. They are sold and bought as balbriggans—which is the point.

Rayon in Bathing Suits

Probably the best example of the complete adoption of rayon by the knitting trade is given by the fact that it is being increasingly employed in bathing suits. From the earliest stage of its development the chief argument made against the new fibre has been its great loss of tensile strength when wet, and it is extremely interesting to find it being used in larger quantities right along in garments which receive the severest imaginable tests from water.

Even the lowest priced staple bathing suits for men are being offered for next year with rayon stripes. These latter have succeeded the colored worsted stripes that were so popular for the 1925 season.

A prominent manufacturer of quality goods showed this spring for the first time unusually attractive bathing suits for both men and women made of two ends of 50 denier rayon plaited over long staple Australian worsted. Beautiful random effects were obtained in the dyeing. The suits are so knitted that all the strain is taken up by the worsted yarn, and it is understood that they have stood up satisfactorily under severe tests in actual day-to-day wear in the water.

Knitted scarfs, neckties, and other of the minor classifications of the knitted outerwear industry provide a market for rayon which should expand materially, over the long future. These goods are subject to the same style fluctuations as sweaters, but even at the height of a depression they provide an outlet which is by no means insignificant.

Rayon Boon to Cotton Goods Manufacturer

Enables Him to Make His Product More Attractive Without Material Increase in Cost—Glorious Future Predicted for Rayon in This Branch of the Industry—Its Use in the Warp Expected to Increase in the Future —Optimism Should Be Tempered with Caution to Prevent Overproduction

ENORMOUS strides made in the use of rayon by cotton goods mills in the United States during the last year or so form a record of progress which has perhaps never before been equalled in this industry.

Nearly every mill in the country equipped to handle it has experimented with rayon; its use as a filling yarn has grown by leaps and bounds; in many cotton goods centers rayon has occupied the center of the stage and live manufacturers have been turning eagerly in all directions for information as to correct processing, the possibilities and the limitations of the fibre.

It should be stated at the outset that this interest has been a quality one. While cotton goods mills have very largely increased the quantity of rayon they are consuming during the last year and will continue to increase their takings of the new fibre, it is ridiculous to talk, as some in the trade are doing, of rayon eventually replacing cotton to a large extent.

If such a development is in the cards it is certainly not yet within the range of vision of far-sighted and shrewd merchandisers. From available statistics it is a simple matter to prove how alarming the alarmists can be over the extent of the use of rayon by cotton goods mills to date.

Simple Arithmetic

In 1924 total domestic production of rayon is reliably estimated to have been 40,000,000 lbs. Of this total cotton goods mills are estimated to have taken not over 10%, or approximately 4,000,000 lbs.

Last year the spindles of mills in the United States consumed in excess of 6,000,000 bales of the domestic crop alone, or roughly 300,000,000 lbs. of cotton.

Thus the quantity of rayon consumed by cotton goods mills last year was less than 1½% of the quantity of domestic cotton used by these mills. Certainly not an alarming percentage, and one which may be extended materially before there will be any sense at all in talking about artificial silk as a competitor of cotton.

An Auxiliary Fibre

As a matter of fact, it is much more logical to regard rayon as an auxiliary to cotton, wool and silk, rather than as a competitor. Its function thus far in weaving has that of a powerful subsidiary fibre, and that promises to continue to be its place.

Rayon lends luster and sheen to many cotton goods fabrics which are in need of brightening up. It allows of interesting design and color combinations which are not possible through the use of cotton alone. It enables the manufacturer of specific classes of merchandise to brighten up his goods, make them more pleasing to the eye and add to their saleability. It enables him to do all this with relatively slight increase in the sale price of his product.

This last, of course, is the main point. We are still in the comparative infancy of rayon development, both of the fibre itself and of its employment in weaving. To some extent it is possible that all-rayon goods woven by cotton goods mills will have a large place in the markets of the future. If this is to be the case, however, it seems likely that from the cost standpoint, as well as from that of the character of the fabrics, they will be more a competitor of silks than of cottons.

From the course of events to date and any reasonable outlook on the future it is logical to predict that rayon will continue to fulfill its destiny by being an agreeable helpmate for cotton, not a sinister conspirator which will eventually displace it to an appreciable extent.

The Novelty Trend

Striking progress has been made in the employment of rayon, chiefly for decorative purposes, in many classes of cotton goods. The two divisions of fabrics in which it has been most largely used are dress goods and draperies. In practically every subdivision of these main classifications artificial silk has already played a large part. It would be idle to attempt to list all of the various fabrics into which it has been incorporated, but it has already to its credit a number of merchandising feats, and several of these will be treated at greater length later in this article.

The sudden increase of interest in the fibre on the part of cotton goods mills is easily explainable, of course. Faced with a serious reversion from staple goods of all kinds, manufacturers have naturally turned their attention to novelties in rapidly increasing numbers. Many staples and semi-staples which sadly needed sprucing up are receiving it under the impetus of necessity; many so-called fancy fabrics have welcomed with open arms the promise of assistance held out to them by rayon in making themselves more acceptable to the increasingly particular consumer, and in most instances they have not misplaced their confidence.

Who will say that the employment of a fibre, whose qualities challenge the abilities of the best technicians at the manufacturing end and give the salesmen something worth enthusiasm, is bad for the industry? Who will say that a fibre, the use of which demands better styling of cotton goods, is bad for the industry? Capable critics consider that what the industry most needs is more interest in style goods, and what is better suited than rayon to give it this interest?

No answer occurs to us, yet heated discussion continues as to whether or not the increasing use of rayon is a blessing or a curse in disguise.

Unbalanced Production Factor

One of the important points made against rayon in the cotton goods mill is that, for the large majority of plants which have their own spindles, it unbalances production. The more artificial silk used the less cotton yarn necessary: Result, idle spindles, but very active overhead on them. Which is true, of course.

Under market conditions which have obtained for some time it has been impossible to sell the surplus product of cotton spindles at a profit. Many mills have consequently been forced to shut down part of their spinning and to cover this overhead—or try to cover it—in the price asked for their rayon mixtures.

A logical come-back to those who complain of this condition is that you can't eat your cake and have it. Everything is not milk and honey. There are disadvantages in almost all of the things in this life.

Those who emphasize the unbalanced production necessary for most mills producing rayon-mixtures would do well to consider these propositions: Is it better to run, say, 50% of the spinning and 100% in the weave room; or to run 50% of the spinning and 50% of the looms?

Not a few mills have discovered in the last year that the employment of

rayon gave them a better market for their goods and fuller employment for their looms than would have been the case had they stuck to all-cotton fabrics; many mills following this procedure have been able to make some kind of a showing for their stockholders, even in times like these.

There is perhaps too much theoretical consideration in the industry of 100% production, a theoretical maximum which is seldom achieved even in boom times.

Revolution in Bedspreads

The fabrics which come most easily to mind in any consideration of rayon mixture goods are the large variety of dress fabrics in which the fibre has been employed with excellent results. There is hardly any kind of dress or wash goods into which artificial silk has not forced its way, imparting decorative effects of great beauty.

It is bedspreads, however, to which the student can point as probably the best example of the influence of the new fibre in the cotton goods field. The character of bedspreads made in this country has been almost revolutionized during the last few years, the change being from the plain white jacquard spreads to the colorful spreads now so largely used.

Credit for this change, regardless of whether or not it may be classed as desirable or otherwise, must largely go to rayon. The crinkled bedspread has had an enormous vogue, and the biggest sellers in crinkled spreads have been the rayon-filled ones.

The beautiful dyed effects possible through the use of artificial silk have certainly played a leading part in transforming the average bedroom in America from a rather drab room, thought of only as a place in which to sleep, to a harmoniously decorated room in which an almost infinite variety of color schemes may be worked out.

Draperies and Shirtings

Rayon-decorated drapery and curtain fabrics have made it possible for the average housewife in average circumstances to make more out of her home than was ever before possible. They have brought to her at reasonable prices materials in a great profusion of design and color. The material increase in interest in interior decorating has been an important factor in this development, it is true; but, conversely, it is probable that this interest in interior decorating has been heightened by the fact that materials of the desired luster and color have been available at reasonable cost.

Employment of rayon in shirtings is an old story. Its use in this field has been somewhat retarded until recently by the vogue of the plain white shirt, but the increasing tendency toward novelty colored effects in shirtings and the growing vogue of the colored shirt with self-colored soft collar attached have been helped by rayon. Even conservative men seem to be working away from exclusive use of the plain white shirt, in conformity with the trend toward novelties in all kinds of wearing apparel.

Overproduction?

In dress goods the manufacture of rayon-filled fabrics has been extended so rapidly this year that commission house men are already talking about overproduction in this field. Those mills which got into the business early made a good thing out of it. Profit margins were satisfactory up to a few months ago when a flood of new merchandise came into the market and competition forced prices down to the point where representative mills claim there is nothing in them now.

Such statements may be and undoubtedly are exaggerations, yet they call attention to an important fact—that the market for what may be broadly termed novelties in this country is a limited one. Every mill in the country cannot make novelty fabrics. Every mill in the country cannot employ rayon. It is logical to expect overproduction in these United States on anything which comes to general knowledge as good, and there undoubtedly will be, if there is not now, an overproduction of novelty fabrics.

All this points again to the conclusion that rayon is an interesting and extremely valuable adjunct for the cotton goods mill, but the use of rayon is not its main mission in life. Fifty years from now there may be no limit to the use of rayon by the cotton goods manufacturer, but today there is. Merely because rayon-decorated merchandise has been and will be good is no sufficient reason for any and every old kind of a mill to jump into the production of merchandise of this kind and expect to get out whole.

A Glorious Future

On the other hand, no room for doubt exists that developments in the use of rayon by cotton goods manufacturers during the next few years will be at least equal to the progress that has been made to date. Experiments are now in process in a number of plants, both East and South, which will not bear fruit for some time to come, but enough is known about them to make possible the prediction that the possibilities of the new fibre have not been anywhere near exhausted.

Far from cursing out rayon as a disturber of their equilibrium, cotton goods manufacturers should regard it as a boon to them in their time of severest trial. It has opened up merchandising possibilities which otherwise would have been total blank spaces. It should continue to do so.

The position of rayon in the cotton goods mill is established and secure. Its future should be a glorious one.

Rayon Gives New Life to Worsted Dress Goods

Dye Resisting Property of Rayon Gives Staple Mills Means for Introduction of Color into Piece Dyes—Luster of Rayon Lends Brightness to New Lines—Men's Wear Mills Find Rayon Most Useful in Lower Priced Lines—Use in Wool Goods Will Vary With Demand for Fancies

By William B. Dall

THE high point so far reached in the use of rayon in woven woolen and worsted fabrics will be seen during the coming season. It is the consensus of opinion among mill agents that the extent of its future use rests with consumer reception of the new lines. Rayon has been seized upon by many in the women's wear trade as a new and live element in fabric design and they are promoting it as extensively as possible. They acknowledge, however, that its future rests on consumer taste, and they point out that coming years must naturally have ups and downs so far as extent of rayons use in wool goods is concerned, varying obviously with consumer demand for decorated fabrics.

The present position of rayon in men's and women's wear is the culmination of a gradual start, actually beginning, so far as one mill at least was concerned, 13 years ago. During the first 10 or 11 years progress in the industry as a whole was gradual, but during the last year or so the rising current of demand for fancies has been met more and more with generous use of rayon decorations and other effects gained by use of rayon in various combinations.

It is interesting to note that the rise of rayon in woven wool goods has not meant the fall of cocoon silk. So far as can be learned from talks with the men who are designing and selling the lines where rayon is most featured, this fibre is not taking the place of silk at all, but it is being used for its own qualities by many mills which never used a pound of real silk in their manufacturing experience. It is safe to say that the most general use of silk yarns in woven wool goods for many years has been the silk decorations in men's wear worsteds and to a lesser extent similar decorations in the better grades of men's wear woolens. These uses continue unabated, while the extensive use of rayon in women's wear is an entirely new note in fabric styling. In men's wear rayon has been appearing in those cloths which formerly used mercerized cotton yarn for their decorations, or silk most sparingly.

Since the first of August a number of prominent mills have opened their lines of women's wear for next spring. Each has tried to outdo the other in the attractive intermingling of rayon with their fabrics, and it is safe to say that more than 75% of the color introduced into these lines has been by means of rayon. It is the fact that rayon resists wool dyes that recommends it as highly as any other one factor to stylers. The big mills whose volume output has been in the realm of piece dyes were baffled at first when demand turned from solid color, staple weaves to bright patterns and attractive mixtures. Their problem is solved this year by rayon and the brightest stripes of green, red, blue and white, may appear on a ground of any color, the whole fabric being piece dyed without the slightest trace of any tint even on the white, bleached rayon.

The new life which has been injected into the product of the worsted industry's large staple mills encourages them to look for a wider distribution than they have seen for a number of seasons. The fact that rayon has been approved by many of the French authorities, including Rodier, gives a dignity to the new lines which they might not otherwise possess in the eyes of some garment makers and women consumers, and which they would not have possessed several years ago. It is unlikely that any one mill will corral all the business in rayon decorated women's wear since they are all showing well designed and well executed fabrics. On the other side of the picture, however, the mill which does not join the procession, is likely to be left far behind at least so far as the coming season is concerned.

Indefinite Variety of Effects

There is an interesting variety in the manner in which rayon may be introduced into a wool cloth and there are corresponding subtle differences in effect. It may be used as a straight fibre, in single or ply, or the fibre may be loosely or tightly twisted with worsted yarn. The rayon may appear as spun waste, also single or ply, or with this spun waste yarn twisted with worsted. Finally rayon waste may be carded into mixture with wool before the spinning of the woolen or the worsted yarn.

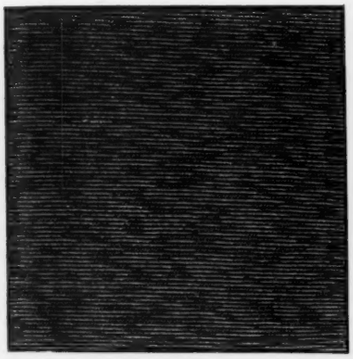
For the best display of luster the straight fibre is used most frequently in two-ply, while for a soft two-toned effect the rayon is used twisted with worsted. The carded mixture also gives a two-toned effect when dyed with that in mind, but this com-

bination is most frequently used for the face yarn of the bolivia type coating. The luster which it adds to the face gives an approximation of cashmere. The now popular balbriggan gets much life when knit of a worsted and rayon twist.

The largest selling rayon yarns in the woolen goods field at present are the 150 denier in two-ply for decorations and the 100 denier single for use as twist. In most of the new women's wear fabrics the rayon is distinctly more then a decoration since it forms the pattern theme of the design and carries most of the brightness of color.

Difficulties Have Been Overcome

The rapidly increasing use of rayon has not been accomplished without the overcoming of difficulties and the

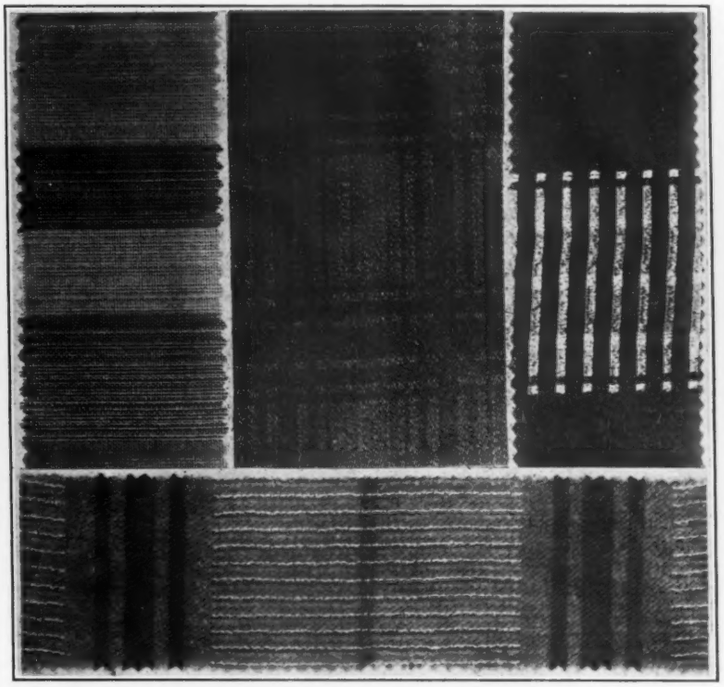


"Metal Glow," a product of the Botany Worsted Mills. A rayon twisted warp gives a two-tone effect with suggestion of a "watered" finish.

meeting of criticism. From the start there was the technical difficulty at the mill involving allowance for the fact that the rayon shrinks only slightly upon finishing while the wool often shrinks a great deal. Early efforts at stripes along the warp found many pieces of goods cockled and uneven because improper allowance was made for shrinkage. Several agents report that their first experiences with rayon involved much trouble with broken yarns. While a break in any other warp or filling yarn might be repaired, a break in the fine white or colored hair line of rayon would stand out sharply against the monotone ground on which it was most generally used. Many such breaks in a fabric would be difficult and expensive, and after all unsatisfactory, to repair. Both this skill in handling rayon and the quality of the rayon itself have been improving during the last few years with the result that mill men report that the breakage difficulty has been practically overcome. It is important that the operatives at the mill know the best methods of handling this yarn, and those who have worked with them find that they pick up the matter quite readily.

Less Interest in Fine Men's Wear

In the best grades of men's wear fabrics there is scant use of rayon and not much interest in it. It is stated even by those who use rayon in their best grades of women's wear, that the fibre is not suitable for uses where subjected to very hard wear, particularly if this wear is accompanied by perspiration. In silk decorations on the best grades of men's wear worsteds, cocoon silk is not at present being superseded. The dye resisting qualities of rayon hold to no advantage here since these goods are dyed mostly in the skein or the top. The amount of decoration per yard is not great and as a result the price advantage of rayon becomes a very small percentage of the total cost of the fabric. Manufacturers of these



Group of Rayon Decorated Women's Wear Woolens and Worsteds. Left: Colored Stripe in Piece Dye with Rayon Submerged in Fabric. Center: Two-Tone Plaid. Right: Vari-Colored Stripes on Rep Ground. Bottom: Decoration of a Kasha-Like Fabric.

men's wear fabrics are consequently not turning from their accustomed paths, and much missionary work will have to be done if they are to become rayon users.

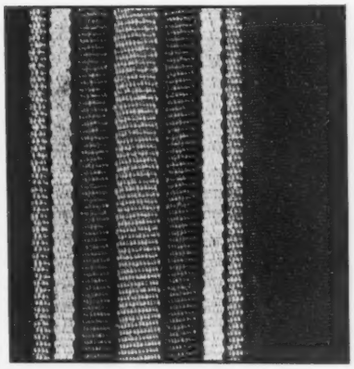
Its biggest use in the men's wear field is in fabrics of the lower price ranges and particularly in tropicals. Because the latter class of fabrics have been sold on a low price basis, the introduction of lustrous threads has been effected by the use of mercerized cotton. Several makers have now turned from mercerized yarn to rayon, and one of them reported late in August that he had just bought a hundred thousand pounds of rayon where he would have bought mercerized cotton a year ago. The rayon is a bit more expensive, but it gives the fabrics more life and brilliance. As mentioned above rayon has not replaced any extensive amount of silk in the better grades of men's wear. It is interesting to note however that one selling agency which has not so far shown rayon decorations in its regular line, is making up fabrics with rayon on special order from certain customers, because those customers want the rayon rather than the silk.

Dye Resistance a Great Virtue

In women's wear rayon is used in many places where silk could not be used because the latter is likely to be stained in piece dyeing, while the rayon offers easy facility for the introduction of any contrasting colors or white as the designer may see fit. Price is also a factor in the present wide use in women's wear, since it is appearing on many popular priced styles which would be handicapped if burdened with the additional cost of silk yarn. Many women's wear mill agents are frank in their statement that their use of rayon is purely experimental and that they have not worked with it long enough at the mill or among their customers, to have a real knowledge of its suitability for the various uses to which they are putting it.

When used as warp for a poplin or a rep, rayon is usually twisted with worsted, and a number of attractive effects produced by this construction are on the market. A subtle two-toned effect is thus produced which varies in color with the angle from which the face of the cloth is observed. The number of turns per inch in the worsted-rayon twist, control a shadowy or watered effect. The use which gives rayon the greatest prominence in fabrics is in stripes and plaids, the colored lines, whether wide or narrow, being woven of rayon. These effects are now particularly in vogue on rep weaves and the variety of patterns in size, shape and color is limited only by the ingenuity of the designer. The use of any of the striped patterns on one-half or one-third the width of the piece, produces a bordered effect which is proving popular because of the flare for border printed goods. Silk decorated reps are to be had at about $2.10 for 54 inch, 8 oz. goods.

In a sheer worsted fabric, rayon may be used principally as the carrier of a contrasting color in a piece dye with little reference to its lustre. Examples seen of this class of use show the rayon very much in the background, but its contrasting color shows through clearly because of the fineness or the spacing of the intersecting yarns. Obviously when the luster of the rayon is the feature to be brought out the yarn is brought nearer to the surface. In pile fabrics rayon waste mixed with wool has been used very effectively. The best manufacturers decry its use, but after all it produces a fabric with richness of appearance impossible of presentation to a woman of limited means in any other construction. The fact that certain mills have been successful with these combinations, while others have experienced difficulty suggests that after all the progress to be made lies in the technique of manufacture.



A brilliantly striped rep from the collection of the Andrews Mill Co., a pioneer in rayon use. There are three colors in the rayon stripes against a ground of a fourth color.

The use of rayon in men's wear at present is much more limited than in the women's wear field. As mentioned previously its use so far is limited to the cheaper tropicals and the lower priced woolens and worsteds. Obviously the amount of silk decoration to be introduced into any men's wear fabric is small, and a radical change in style would be necessary to popularize any more pronounced use of lustrous yarns in men's goods.

Worsted Mills Active in Rayon

The pioneer in the use of rayon in women's wear fabrics so far as we can learn is the Andrews Mill Co. which was one of the early customers of the American Viscose Co., and showed a line introducing rayon as long ago as the season of 1911–1912. It is stated by an executive of that company that in all seasons since that

time rayon has appeared in the company's products. The new lines of this company show further attractive developments in rayon use.

The Botany Worsted Mills is making history in the progress of rayon by its varied and attractive use in the new spring line opened shortly after Labor Day. Botany has been experimenting along these lines for some time and last season showed a rep weave with a two-toned effect due to the introduction of a rayon and worsted trist.

The Arlington Mills, Pacific Mills, Atlantic Mills, Amoskeag Mfg. Co., and the Lorraine Mfg. Co. are all doing extensive work in rayon in their new worsted lines. The fabrics lately seen in the offices of these corporations are varigated and brilliant almost beyond belief for the product of a piece dye process.

The life of these large manufacturing units has in the past been in the production of staples, and they are now going into a new era of colored patterns which would have been wholly impossible without the wool-dye resisting properties of rayon. The fundamental weaves of the new lines are staple still, at the moment running largely to reps, but the introduction of rayon takes them out of the staple class so far as appearance to the consumer is concerned, and will, it is hoped, give them a selling appeal which will make a good volume of business possible through the next year or so.

Possibility of Rayon in Silk Goods Unlimited

Fabric Creators Find a Splendid Ally and Not a Competitor—Use in Ribbons Increases—Staple Broadsilks, However, Consume Relatively Small Quantities—Achieves Results that Cannot be Obtained with Silk Alone—Extension of Use in Crepes Depends on Two Factors

By William A. Spafford

THE use of rayon in broadsilks and ribbons is steadily increasing. Each year the total quantity of rayon consumed in the manufacture of silken fabrics, both narrow and wide, has surpassed the total of the preceding year. Moreover, the rate of increase has been far greater than that of natural silk itself. In 1915 the silk trade used approximately 350,000 lbs. of rayon while in 1923 it used 5,900,000 lbs. and in 1924 close to 7,000,000 lbs. Over the same period the consumption of raw silk has more than doubled but such a showing does not compare with the twenty-fold jump in the use of rayon. Such figures, however, are more numerical in their significance than anything else and raw silk to the silk manufacturer still remains his most important material.

In the novelty fabrics, rayon has had its widest use and to the fabric creator it has proved a splendid ally. As in many other fields, it has been found to offer almost unlimited possibilities when used in combination. It is not a substitute for silk in any sense of the word and it is not necessary for it to assume this role to take on an increasingly important place in the silk manufacturers' scheme of things. All of the important novelty houses in the trade have long since realized this fact and have acted accordingly.

Moreover, silk and rayon novelties are not brought out to sell in a low price range. In jacquard materials with silk warp and a rayon pattern showing on the face, exceptionally beautiful results have been obtained. The same can be said of the over plaid effects which were sponsored by several houses for the past spring season, and which consisted of rayon in combination with silk and sometimes worsted. But these materials were far from low priced and were brought out as a style proposition and not a price article.

In the chenille cut effects, which have been popular for several seasons and which are selling well for this current fall, an important point can be brought out which has to do with all silk and rayon combinations also. This is that the reaction of silk and rayon to various dyes is different, as silk is an animal fibre and rayon is a vegetable fibre. In addition the dyeing qualities of "regenerated cellulose" rayon and cellulose acetate rayon are also different. This fact offers a fertile field to the designer and furthermore aids materially in cutting down costs. For two- and even three-tone effects can be readily obtained in piece dyed fabrics where if the goods had to be yarn dyed the costs would be much higher. The three-tone effects can be obtained by the use of silk warp with filling of part viscose rayon and part Celanese.

Necktie Fabrics

In necktie fabrics a number of silk firms have incorporated rayon. These numbers, however, were brought out more or less to fill a demand at a price. The patterns were jacquard designs of rayon on a silk ground and final judgment as to the possibilities of rayon in such materials must be withheld. The lack of the quality of elasticity that raw silk possesses may operate against its use in this field. More will be said on this topic a little later on.

Satin-faced materials would naturally be thought to offer a particularly inviting field for rayon with its exceedingly lustrous nature. The American user of silks, however, has never taken very strongly to the rayon satins as a dress material. On the Continent, particularly in France, rayon satins have had a considerable vogue for several years. The satins themselves, together with fabrics such as the alpacas, have been so widely used that many visitors to France have commented on the sleek, shiny appearance of the Frenchwoman when dressed for the street or for that matter, almost any occasion. In this country the excessively high luster which endeared it to the heart of Mademoiselle in France has rather militated against its popularity. While a considerable quantity of satins is being woven with a rayon face, it would seem that the mills making them are not in many cases broadsilk mills, and their use is more important in draperies and household decorations than as a dress fabric. Several large manufacturers of silks stated that they were running a certain number of looms on rayon satins but that they did so more to round out their line than because of any large demand for this type of material. The goods in all cases were made with either a cotton warp and rayon face or spun silk warp and rayon face.

Rayon Taffetas Good

In taffetas, however, the use of rayon appears to be making rapid strides and a large and increasing quantity of this type of goods is being woven. The trend of the last four or five years toward the use of silks or what appears to be silk in household decoration has done much to stimulate the demand for reasonably priced, silky appearing materials with not too much emphasis on their wearing qualities. Rayon fits in nicely here. A number of Paterson mills have been working day and night for the last several years on one type of goods alone. This is a rayon taffeta using a two-thread organzine warp and a rayon filling. Two-tone effects are obtained because of the fact that the goods are yarn dyed and the extra expense is saved to some extent for there is no necessity of a costly finishing process.

The use of rayon taffetas is large in draperies, bedspreads, table covers, lamp shades, and such. While taffeta as a dress material has not been to the forefront for quite a long time, a certain amount of rayon taffeta has been seen in kimonas, negligees, etc. The attractively low price at which the material can be sold, close to $1.00 a yard over the counter and below this at wholesale, has encouraged its use for the above purposes.

Use in Crepes

The largest, and at first thought the most inviting, field for rayon would appear to be the staple crepe fabrics such as crepe-de-chine, georgette, crepe satin, flat crepe, and the many other minor variations of the foregoing. An offhand estimate would place the quantity of staple crepes manufactured and sold at from 60% to 70% of the total products of the silk industry. If rayon could be incorporated in this class of materials, it can readily be seen that its consumption in silks would show a substantial increase. Up to the present time, however, its use here has been negligible and over the past year of active business it has lost rather than gained ground. A certain quantity of goods is being woven today and will continue to be woven which is made with a combination yarn filling. That is to say that the filling used contains one, two, or three ends of raw silk doubled and twisted with one end of rayon. How large this quantity is there is no way of knowing but the testimony of many throwsters is that they are throwing less of the combination yarns than a year or two ago. This applies to crepe combination yarns and has no reference to combination hosiery tram.

When the yarns combining rayon and raw silk in crepe twists first began to be sold in any volume some two or three years ago, silk manufacturers took to them with enthusiasm. The position of the raw silk market, which ranged between $8.00 and $10.00 per lb. at the time, and more particularly the situation in the finished goods market, made the saving in the cost of the material look very attractive to the harassed manufacturer. The broadsilk market was then reflecting to a certain extent the overproduction of high priced all-silk goods in the keen competition that existed and the 5 to 15c. a yard that the mill owner could save appeared to him as the deciding factor that would put his merchandise on a competitive basis and possibly give him a slight edge. Many made the experiment and started weaving crepes containing a proportion of rayon.

The results cannot be said to have been entirely satisfactory. In appearance it was very difficult to detect the merchandise that contained rayon from the all silk goods, particularly where the percentage of rayon was small. However, even where one end of rayon was doubled with four or five ends of raw silk the goods had a slightly harsher feel and as the proportion of rayon increased, the soft crepey feel was lost to an increasing extent. It is questionable though whether this alone would have prevented a steady

il increasing use of the combination crepes were it not for the fact that much of the life and resiliency so desirable in a silken fabric was lost. The silk and rayon materials creased easily and retained the creases until the goods were pressed.

Over the past year there has been another factor that has operated against any widespread use of rayon in crepe filling and that has been the excellent demand for all silk materials. So large has been this demand that silk manufacturers have found their greatest difficulty in producing enough goods. Under these conditions it is only natural that they should play up to the demand at the higher price range for this increases the percentage of profit on the volume of business handled.

As to the future possibilities of rayon in the staple crepe fabrics there would appear to be two opportunities for rayon to come to the fore again. The first is if the makers can improve their product to a point where it has more of the properties of natural silk. The foremost consideration here would be attainment of a yarn having something approximating the elasticity of silk. Though there is the temptation to pass this off as an impossibility, one has only to review the tremendous strides made in the last 20 years to call a halt to any hasty judgment in the negative. Then again there is the chance that the silk goods market may repeat one of its familiar cycles of less enthusiastic demand. This would bring in its wake the price element and the consequent efforts and experiments to produce something nearly as good at a price. Should the two come together, that is, further improvements in technical perfection of rayon yarns at the same time that the market demands something less expensive, the substitution of rayon might proceed at an accelerated pace.

Use in Ribbons

In ribbons the trend to rayon appears to have been greater than in broadsilks in the past few years. Moreover, this trend has continued over the past year possibly because the ribbon manufacturers have not experienced the same enthusiasm for their products that the broad goods have. Then too, many of the disadvantages of rayon when used in broadsilks are of distinctly less importance in ribbons. In the narrow novelties rayon has been employed to obtain effects that independent of any price appeal which holds true likewise for the wider goods. In staple narrow ribbons for decorative effects such as Christmas ribbons, and the vast yardage used on candy boxes, cigar boxes, etc., the lower cost of the rayon has been a factor of prime importance.

Taking a broad, general view of the whole matter one feels justified in saying that up to the present time the use of rayon by the silk trade has been as an accessory and aid to silks rather than a substitute. To some extent it has displaced raw silk in both silks and ribbons but not to any large extent. This latter statement seems amply substantiated by the fact that imports and consumption of raw silk during the past crop year—that is July, 1924 through June, 1925—has far exceeded any previous year and in addition that the rate of gain has been fully comparable with the steady growth in the demand for silks in previous years. Rayon at present and possibly for some time to come will find its greatest use in combination with silk to produce effects and achieve results that cannot be obtained with silk alone.

The Marketing of Rayon

By J. H. Hammes

WHEN touching on the subject of the marketing of Rayon, we must include the importations along with the domestic productions. Although minor in proportion to the domestic, the imported product has a real bearing on the market situation.

With the greater rayon producing companies here, marketing in the past has been more or less an opening and closing of the books, carried on quarterly, this situation being the result of the demand leading the supply. By no means does this imply that a mill's output is taken up regardless of its quality; quite the reverse. The trade in general must first put its OK on a brand before it can be included with the leaders. This means that the quality of a producer's output must be of evenness in size, a clean fibre properly reeled, having strength and pliability, and last but not least, must stand the dyeing and finishing processes. These with numerous other details are the essentials in rayon production which place its producer in Group I. Here we most likely have the reason for there being about half a dozen producers in this group today.

Changes Likely

Until the saturation point is reached, the policy of specific allotments to regular customers will most likely continue with the manufacturer. How soon the saturation point will be reached is a matter for conjecture; at present it seems quite distant.

When the time comes that the demand and the supply are evenly balanced, then we shall notice decided changes in marketing. What form these changes will take it is difficult to predict.

In spite of the increased demand for rayon, producers have steadily worked to perfect their product. Greater strength has been attained by the addition of more filaments and at the same time new formulas have created softness. With new and improved developments in the fibre come new uses for rayon, and this fibre is rapidly being introduced in a widely diversified and previously unthought of line of manufactured goods. At the same time, users of rayon are becoming better acquainted with its characteristics and as a result are exercising more skill in its handling.

It is true that specific makes are more adaptable for certain uses, but in the present condition of the market, this fact cannot be taken as seriously by the mill man as it will be when the supply exceeds the demand.

The marketing of imported rayon is carried on in a somewhat different manner. First of all, the purchaser of such rayon usually looks for the same qualities as are found in the domestic product, but he cannot be sure of getting them, and seldom does. If he is making a low grade of merchandise where C or inferior quality can be used, he can possibly get away with it, but if he is making high-grade goods he must be sure of the quality of his rayon and choose carefully his source of supply.

Like the domestic, foreign rayons are improving constantly, and today it is possible to receive a high-grade imported rayon that will answer requirements. For this reason, tradition regarding imported rayons should be discarded. Through confidence in the importer and a fair trial many users have found satisfaction in imported rayons that they have not experienced previously. Today, steady importations allow a buyer to book orders for present and future delivery with satisfactory results.

With the increasing production of rayon, and with its vast expanse in use, its qualities and characteristics are becoming more familiar and better understood by the mill man. Therefore, in the future marketing of rayon, its manufacturer and importer may expect their dealings with the mill man to be of a more understanding and technical nature.

Rayon in Netherlands and Spain

NETHERLANDS plants manufacturing rayon have followed the expansion experienced generally in that industry throughout Europe, and particularly during the last year have not only increased their production at home but have also become interested in the development of plants abroad, notably in Spain, according to a joint report to the Department of Commerce, by P. J. van Hees, The Hague, and Commercial Attache Charles H. Cunningham, Madrid. The Netherlands rayon industry comprises two companies, the larger of which was established in 1911 with a nominal capital of 1,000,000 florins (florin=approximately $0.40), of which 225,000 florins paid up. A small plant was put into operation with highly satisfactory results and a period of rapid expansion followed. Although this company does not publish any production figures, it is stated that in 1922 they produced 300 tons, in 1923 the annual output was doubled, and in 1925 it will probably be increased another 50% making their present production close to 1,000 tons per year.

One of their plants is being considerably enlarged for which purpose additional ground has been purchased on which three more buildings will be erected. At the same time their present personnel of 5,000 will be increased. It is possible, however, that part of the new plant may be devoted to the manufacture af artificial horsehair, artificial straw and other cellulose products. In addition to this they also expect to open a branch at Rotterdam for shipping and grading purposes which will give employment to 1,500 hands.

The second plant in the Netherlands was established in 1919 and at present consists of one plant, the 1925 production of which will probably amount to 1,000 tons.

Although the Netherlands rayon industry makes a favorably showing as regards the production of yarn of good quality, the manufacture of textiles is insignificant and only a comparatively small quantity of yarn is used locally for weaving, knitting or lace making purposes. In spite of the fact that the making of textiles is one of the key industries of the Netherlands, the local mills display little interest in the manufacture of rayon fabrics. Lectures have been held from time to time in the cotton and woolen textile districts by managers of the local rayon plants, but only with meager results. The textile manufacturers are too conservative and seem to be little inclined to embark on any experiments with rayon because the adoption of this new method of weaving would necessitate a replacement of machinery and the training of their present personnel. Therefore the Netherlands rayon industry is entirely dependent on exports.

Spanish Industry

Only one rayon factory is at the present time in operation in Spain and this with a limited production. A new plant, however, is being built in the province of Barcelona, and will start production in June, 1926, with an annual capacity of probably 600 tons. It is reported that this corporation is being effected with Spanish, Dutch, and Belgian capital. The object of this enterprise is the manufacture of rayon, both raw, yarn, and ultimately fabrics, though present arrangements do not go as far as this.

The base for rayon of this factory will be principally of wheat and other straw pulp. The machinery, it is said will be largely if not entirely German, since the Netherlands manufacturers are used to the machinery manufactured in Germany.

SECTION IV--TECHNICAL ARTICLES

THE man in the mill is interested in statistical information on rayon production; in general articles on important phases; in stories of individual plants; and in analyses of market uses. However he is probably even more vitally concerned with articles telling him clearly and concisely how to process rayon in his particular plant. With this thought in mind the editors of TEXTILE WORLD have procured from various authorities a selected group of technical articles which are published in the following section. The problem of selection was a difficult one since it is possible to fill hundreds of pages with good material on rayon processing. The choice was made on a basis of dividing the subject into certain main groups and insuring the coverage of each important branch of the industry affected by the increased use of rayon. Consequently this section represents a broad summary of important technical details of interest to every textile manufacturer, and is particularly designed to offer solutions of the most difficult problems of rayon processing.

Difficulties Encountered by the Rayon User

Special Problems Inherent in the Processing of Rayon—Sizes of Yarns and Filaments as Compared with Those of Real Silk—Adaptability for Warp, Filling, and Knitted Fabric—Streaks, Bars, Shadiness, and Other Defects—Effect of Atmospheric Changes—Various Twists

By James Chittick

THE great and growing use of rayon has brought with it a host of manufacturing difficulties and perplexities, and has introduced a new series of imperfections to perplex the manufacturer on account of his lack of knowledge of the technical features of this material. As rayon has now found its way into endless branches of the textile field, and into all kinds of collateral directions, the number of problems arising therefrom is legion.

Origin of "Rayon"

The term "rayon," as a generic name to be applied to all artificial silks, has recently come into quite general use, having been endorsed by many trade associations, and being applied by different producers to their products. The word is French, one of its meanings being a ray, as of light, and the thought in the minds of certain of those who sponsored it was that, being a term unknown to most of the English-speaking public, it would permit of no confusion in its use. It was believed that it could not be mistaken for anything else, and would still be applicable to the product as expressing its outstanding characteristic of lustre.

Unfortunately, many people in the trade do mistake its meaning, and have the idea that rayon is some new and particular kind of artificial silk. Some, again, think it is a special name for viscose silk, and some think it is a name that applies to all artificial silk other than acetate silk. Thus, it is quite common to hear some manufacturer or converter speak of ornamenting a fabric with alternate stripings of rayon and celanese.

If the use of the name rayon is extended to France, the opportunities for misunderstandings as to its meaning will there be multiplied. However, as it has received such strong and general backing, it is likely that it has come to stay, and those who are now ignorant of its meaning will have to better inform themselves.

It is not intended in this paper to cover the subject comprehensively, but to draw attention to some of the more salient points in the hope that a better understanding and appreciation of these will be useful to the readers of this publication.

Common Sizes

For a long time, the sizes ordinarily available on the market were principally those from 120 to 150 deniers, especially the latter, with a large use, also, of 300 denier size. The prominent manufacturers of rayon have, for many years, been in a position to supply much finer sizes; but so long as they could not keep up with the demand for the coarser sizes, there was no incentive to put on the market these finer sizes, the production of which is much slower and more costly. With the immensely increased production and competition in this material, finer sizes have now come on the market in a large commercial way, and denierages from 50 upwards can now be procured. These vary, usually, in steps of ten deniers each, as 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150; while, above 150 deniers, the steps are much further apart.

It must be clearly understood that the making of these finer sizes is not done simply by a reduction in the number of filaments composing the threads, but that it is accomplished by the making of much finer basic filaments. Thus, in a thread of the 150 denier size, approximately 16 filaments will generally be found. But, also, in the 45 denier size sold by one large producer, and presumably also in the product of other makers, there are but 13 filaments. Therefore, the size of the individual filaments used in this finer yarn will be approximately 3½ deniers, which is getting measurably near the fineness of natural silk.

In natural silk, the ordinary 13/15 denier size (average 14 deniers) is generally reeled from five cocoons, and as each individual cocoon thread is double, this gives ten basic filaments for the thread, or an average of 1.4 deniers per filament. Of course, there are plenty of cocoons with finer filaments than these, and also, many with coarser filaments. On the other hand, in a 150 denier thread made from 16 filaments, the average size of the individual filament would be about 9 1/3 deniers. These figures are given without any allowance for the take-up or shortening of the thread in twisting, which, while not very great, is still to be reckoned with. Undoubtedly, we may look for even finer filaments in the future. A couple of years ago, Mr. Benno Borzykowski, a great authority in artificial silk matters, showed the writer a skein which he said was 40 denier artificial silk, and which he also said was composed of 47 filaments, which would be substantially finer than the ordinary sized filaments of natural silk. This was probably a laboratory production, but, none the less, it is an indication of what may yet be done.

Number of Filaments

The writer has recently assembled some information from samples in his possession (some of which are referred to above), showing the number of filaments and their denier sizes in various rayons. They are as follows:

Tubize Silk (Nitro-Cellulose)

Denier Size	*No. of Filaments*	*Deniers per Filament*
50	10	5
60	10	6
70	10	7
80	10	8
90	12	7 1/2
100	12	8 1/3
110	12	9 1/6
120	20	6
130	20	6 1/2
140	20	7
150	20	7 1/2
160	20	8
170	20	8 1/2
180	20	9

Viscose Silk

Denier Size	*No. of Filaments*	*Deniers per Filament*
120	14	8 4/7
130	14	9 2/7
150	18	8 1/3
300	28	10 5/7
450	42	10 5/7

Elberfeld Silk (Cuprammonium)

Denier Size	*No. of Filaments*	*Deniers per Filament*
250	18	13 8/9

Celanese Silk (Acetate)

Denier Size	*No. of Filaments*	*Deniers per Filament*
45	13	3 6/13
65	20	3 1/4
90	30	3
130	40	3 1/4
150	26	5 10/13
180	60	3
300	50	6

Lustron Silk (Acetate)

Denier Size	*No. of Filaments*	*Deniers per Filament*
150	16	9 3/8

Bemberg Silk (Viscose)

Denier Size	*No. of Filaments*	*Deniers per Filament*
120	stated 90	1.33
150	stated 110	1.36

The extreme fineness of these Bemberg filaments bring them to an equality of size with natural silk filaments.

These varying degrees of fineness are doubtlessly obtained in large part by a substantial stretching of the filaments after they are spun and while in a more or less plastic condition. In fact, in many cases, a stretching is necessary to develop the characteristic luster of the material. The Bemberg silks have a much more subdued luster than most of the others, and look remarkably like real silk in that respect.

Those yarns made of filaments of very fine size have a far greater softness and pliability as compared with those made of coarser filaments, which greatly extend their sphere of usefulness. Twists of 2½ and 3 turns per inch are quite commonly employed.

Most rayon has a heavier specific

gravity than natural silk; so, for a given size, the weight will be greater. Also, owing to the usually much greater coarseness of the filaments as compared with those of real silk, the covering power is substantially less, and more threads will be required to give an equal fineness of texture to a fabric.

The acetate silks are said to lose only approximately a quarter of their strength when wet, while most of the other makes are likely to lose three-quarters of their strength, the full strength, however, being recovered when dry. But it is to be carefully noted that if they are stretched, even when in their natural dry condition, they do not spring back to their original length. Celanese, for instance, can be stretched out greatly while dry, but it stays stretched out, springing back very little This is a matter that manufacturers should pay special attention to, particularly in cases where this material is twisted up with yarn of some other kind—cotton, silk, or what not—to form a combination thread.

As the acetate silks require different dyestuffs to color them than do the other kinds, the makers of celanese have developed a special line of dyes for their yarns. These are now manufactured in the United States, and are offered to the trade for that purpose.

Weighted Silk Compared

As finer and finer threads are produced, the material lends itself more readily to substitution for natural silk; that is, it becomes increasingly possible to use it in place of silk in ordinary standard market fabrics, and this could not easily be done with the coarser sizes. Take, for instance, the filling yarns which are ordinarily used in such fabrics as taffetas, satins, peau de cygnes, louisines, and other yarn-dyed constructions. In most of these the filling will be four-thread tram, weighted 22/24 oz., for colors, and in Japans it is likely to come out on the high side of the weighting, say, at 24 oz. By 24 oz. weighting is meant that the dyer returns to the manufacturer an amount of dyed silk which will weigh 24 oz. for each 16 oz. received by him in the gum. In addition to the natural gum in the silk, the throwster will have added more or less soap and oil, running, in the majority of cases, between 3% and 4%. Thus, a four-thread tram of 14 deniers would weigh 56 deniers, and the soap and oil added by the throwster would raise this, perhaps, to 58 deniers.

There is also a certain amount of take-up or shortening due to twisting; but in tram this is very little, so, for the purposes of the argument, we will not consider it. If 16 oz. is raised to 24 oz., it means that the denier size of the thread (although it is customary to figure thrown silk in drams in this country and England, but not on the Continent) will be increased from 58 deniers to 87 deniers. In the case of three-thread tram, also largely employed, the size in the gum might run 43½ deniers, and this, when weighted to 24 oz. will raise the weight to about 65 deniers.

Organzine Finer

It is quite apparent, therefore, that rayon in the finer sizes now obtainable will not bulk up any larger in the goods than the ordinary weighted silks employed in yarn-dyed fabrications. If the rayon was to be generally used as a substitute for the real silk it would unquestionably displace large amounts of the latter. Of course, it is not silk, and both the appearance and handle of the goods would be somewhat different; yet a large use in this direction is one of the possibilities that we have to expect. As to its employment in the place of weighted organizine, this is another matter.

The most usual weighting for organzine is 18 oz., for colors on two-thread twist made from 13/15 denier raw silk. The union of these two threads gives 28 deniers; and the shortening in twist, which will amount to say 3½%, more or less, will add another denier to it, making 29. The weight is increased one-eighth, or 2 oz., by the dyer, as compared with the gum weight. This will increase it about 3½ deniers, giving a total of about 32½ deniers—a size much finer than any rayon that is likely to be available in the near future, and this, too, without reference to inferior weaving qualities.

Blacks, however, in yarn dyes, are weighted much more than colors, and organzine will ordinarily be weighted 20/22 oz., 22/24 oz., and sometimes 24/26 oz. Taking the latter figure, and averaging it as 25 oz., 9/16 would be added to the gum weight of the organzine, and if the size of the silk in the gum was 32½ deniers, this would add 18⅓ deniers, making a size of about 51 deniers. A 50 denier rayon therefore corresponds closely with this, and if the weaving could be satisfactorily performed, it might take the place, to a certain extent, of the weighted organzine for blacks, without disturbing the weight or balance of the fabric.

Weaving

Coming to the question of weaving, it must always be borne in mind that the rayon thread, which is, in effect, a reconstructed vegetable fibre yarn of continuing lengths of filaments, is extremely smooth, glassy and slippery, and the thread gets its coherence solely from its twist. The more it is twisted, the harder the thread becomes, and the less will be its luster. When, in weaving, one of the filaments will break, the broken fibre, having no natural coherence with the other fibres in the thread, will unwind, chafe up, and become bunched into a nasty tangle from the friction of the harness eyes and the reed.

To overcome this difficulty, it has long been recognized that rayon warps would have to be sized, or dressed, by passing them through certain starchy or gummy solutions, in the same way as is regularly done with cotton, woolen, and worsted warps composed of single spun yarns; and there are some firms who do this work on commission for the trade, and who do it well. In this way, the tendency of the filaments to break, and to ravel out when broken, is greatly overcome and the weaving of rayon for warp is, in consequence, largely practiced.

When thus used for piece dyes, the boiling-off and dyeing to which the goods are subjected removes these gummy materials from the thread; but, in yarn-dyed goods, the case is different, and the addition of these dressings to the dyed thread would naturally be a disadvantage both in the appearance and in the handle of the cloth. Where rayon is used for filling, the stresses that are put upon the thread are relatively little; and so, for this use, it is not necessary that the yarn should be dressed after dyeing.

The question of putting loading, or weighting, on rayon has already received attention, and a couple of years ago the writer was informed that one of the great Paterson skein-silk dyers (and perhaps there are others) had actually worked out a weighting process, though whether it is employed on a commercial scale or not, and just what are the methods used in connection with the weighting he cannot say.

Serious Defects

One of the greatest difficulties experienced in the use of rayon is the fact that, in a great many cases, goods will come up streaky in the warp and cross-barred in the filling—differences in color in these cross bars, etc., being sometimes very noticeable. The writer recently saw some goods in which the pattern was such that the face was practically all composed of the rayon, the cotton warp being the dominant material on the back. There would be places where, within the space of one yard, broad cross bars extending for the width that a quill would weave would show in five widely varying shades of color. These would run from say a seal brown to a tan, and would vary not only in depth of color, but also in tone and shade. The goods, of course, were piece dyed.

While it would seem that a careless mixing of different lots of rayon must have been at the bottom of it, the manufacturer contended that it was all from the same lot of material. This statement, however, would have to be taken for what it was worth. The fact seems to be that in the past (and whether this difficulty has been overcome or not the writer cannot say), rayon took the dye more freely when it was freshly made than when it was old. That is, the older it got, the less receptive it was to the dye, up to a point where it became, as it were, stabilized. Therefore, unusual care has to be taken to prevent the heavy losses that would inevitably follow these variations in color.

If, therefore, the material is for yarn dye, it should be very carefully inspected for color as it comes in from the dyers; and, if variations of shade are seen, the skeins should be very carefully sorted and resorted until each group which has thus been accumulated is properly uniform.

In addition to this, the weaving should be performed with two or more shuttles—and the more the better—so as to blend together and mix up the material to prevent the development of commercial shadiness. Of course, if the goods are to be piece dyed, the above method of inspection will not apply. It is possible, however, to take some sample skeins from each case in a lot and have them dyed in the skein to see whether they come out uniform or not, and then govern oneself accordingly. For piece dyes, it is of the greatest importance that, wherever possible, several shuttles should be used in the hope that this blending of the filling threads will keep the fabric reasonably free from shadiness.

Warp Streakiness

Streakiness in the warp, particularly in satin-faced constructions, where the warp material is rayon, is very common, and is apt to be extremely marked, the variations in apparent shade between the various threads being considerable. Examination will show in those cases that there is a sort of repeating in the occurrence of these threads corresponding with the sections, or bands, into which the warp is divided when it is being made. These differences in color to the eye are likely to be, to a large extent, not real differences in color, but simply differences in the way in which they reflect the light, the basic cause of the trouble being variable tensions among the threads. This may be demonstrated by taking one of the threads at the end of the warp and drawing it out slightly, and as it is thus flattened, and reflects the light differently from the others, it will generally take on the appearance of a lighter hue.

Moderate differences in the stretch of the warp threads will make sharply defined lines endways through the cloth, which are a very serious cause of damage and which are also very common. Every effort must be made to guard against such irregular tensions. Differences in stretch may even exist in the skeins of yarn as they are received from the manufacturer. Therefore, it is good practice to have the skeins that are intended for one day's winding opened up the day before, and hung on racks or poles. The skeins should then be opened up freely and well smoothed out by turning and stretching with a suitable stick. As this material is very responsive to atmospheric moisture, an opportunity is thus afforded for all parts of the threads in the skeins to equalize themselves in this respect.

Winding and Warping

Where the winding is done there should be no open windows, and the operations should be conducted in places where changes in atmosphere will be at a minimum. Otherwise, if

the yarn was being wound where there were currents of air from the outside, the difference in dampness that may exist in the air between morning and evening will introduce into the wound material differences of contraction; and these same remarks will apply to the quilling. It is not judicious, either, to have bobbins partly wound on one day and partly wound on the next, for the same reason.

Great care should also be taken in the warping, and all warps should be completed the same day that they are started, as otherwise, differences in tension may occur between the different sections of the warp. Everything about the warping should be so conducted as to bring all the threads under an even and uniform tension. On the creel there should be no bent or loose spindles, and all of them should stand at exactly the same angle. Under the bobbins, it is well to have porcelain domes to prevent friction that might occur between the bobbin heads and the iron of the creel. Bobbins should not be used in which the holes are unduly worn, or otherwise the pull on the thread will be uneven. the dents of the glass reed, lease reed, and space reed should be in perfect condition and the spacings free from any accumulations of waste. Careful attention to these small matters will serve greatly to eliminate trouble.

Needless to say, different lots of material should never be mixed in the same warp. If, however, there is some left-over lot, not sufficient for a complete warp, which has to be worked up, it might be combined with another lot by warping the two lots end and end alternately. Identifying marks, however, will have to be put on the heads of the bobbins in the two lots, so as to avoid any chance of changing this order of the repeating of the threads.

Effect of Twist

In the widening use of rayon, questions of twist are of importance in many cases. The ordinary twist in such yarns might average perhaps three turns to the inch. As the twist is increased, however, the lustre is diminished. There are certain fabrics on the market with rayon for the warp made in five-harness satin weave, and which have a very dull, almost worsted-like aspect. The weave has the appearance of a steep twill, this twilled appearance being due to the coarseness of the warp as compared with the filling, which is generally silk crepe twist. In these warp yarns, there is likely to be about 15 turns of twist to the inch, which is sufficient to entirely change the appearance of the material. To get this 15 turns, about 10 turns per inch are added to the three already in the yarn, and these extra 10 turns shorten it so that it comes out about 15 turns in the finished thread. The cloth so made has an excellent handle, a subdued lustre, and an attractive face, and this fabric has a wide range of usefulness.

Yarn which has beeen heavily twisted with right and left-hand twist has been quite extensively employed for the filling in crepe materials, particularly in satin-faced Canton crepes, the hard twist robbing the material of almost all of its lustre and giving it the aspect of natural silk. It would not be right, however, to describe a fabric containing such material as a Canton crepe, or satin-faced Canton crepe, without qualifying it with the word "rayon-filled."

Some manufacturers have essayed to combine threads of natural silk and rayon into a crepe yarn. Done with judgment, and with a properly large proportion of the natural silk, this may be commercially accomplished; but, otherwise, very unfortunate results may follow. Thus, the writer has more than once seen yarns where a single thread of raw silk of ordinary size has been twisted with a coarse rayon thread, and where, with the internal stresses in the thread itself, assisted by a cutting action of the natural silk against the rayon, the rayon part of the thread has broken here and there, leaving only the fine silk thread intact, and serious and extensive damage has appeared in the goods in consequence.

Knots in Knitting

In the knit goods trade, the same care should be employed in the manipulation of this material as in the weaving trade. A matter of great importance is the proper tying of the knots so that they will not slip; for, if not very firmly tied and with the proper kind of knot, the knots are apt to open up in the dyeing, and when the goods are subsequently stretched, the threads at these places will slip apart and cause very bad holes. Similarly, in the trimming or picking of the knitted fabrics before dyeing, the pickers unless carefully instructed are very apt to clip off knots or clip the projecting ends so closely that the knots are easily upset. Then, in the dyeing, the closely clipped knots will pull apart, and at these places and where the knots have been entirely clipped off, holes are certain to result.

The best knots to use are those known as weavers' knots. When holes occur in the fabrics (and they are largely caused from the above stated reasons), they have to be carefully darned; but, even then, very noticeable defects are left. In the writer's opinion, it would be better practice to inspect the goods after knitting with great care—and preferably using large magnifying glasses in doing so—to find every place where a knot has been tied, and to mark such places. Then the menders or sewers should darn such places in such a way that if the knots should slip, holes could not develop—thus applying the precept that "prevention is better than cure."

The rayons produced by the acetate process, such as lustron (which has been on this market for several years), and celanese, which is now so widely used, offer immense opportunities in the way of cross-dyes for the ornamenting of fabrics by making possible two-color effects in piece dyes. Another direction, also, in which rayon is used and will be still more largely used, is in yarns combed and spun on the worsted fashion and made from waste rayon, of which the quantity available is always large and growing. Very excellent yarns are now made in this way. A special field is offered in this direction by the blending of acetate silk materials with those produced by the other methods—nitro-cellulose, viscose, and cuprammonium. Thus, slivers of the acetate may be combined with slivers of one of the other kinds; and by repeated doublings and drawings, the two can be blended very thoroughly together. Then, when dyed up, excellent mixture effects can be produced in two tones, or white and color, or what not. Taken all in all, rayon has opened a new and wonderful field to the competent manufacturer who is endowed with imagination and foresight.

Weaving Cotton and Rayon Mixtures

Descriptions of Fabrics Containing Rayon, Including Madras and Broadcloth Shirtings, Voiles, Brassiere Cloths, Jerseys, Draperies, and Bedspreads—Handling Rayon in Both Warp and Filling—Advantages of Drop Box Loom—Friction in Shuttle—Widening the Dents—Cause of Shiners

By John Reynolds

THE properties which distinguish rayon from other fibres have brought new problems to all departments of the cotton mill using it. Its failings have necessitated modifications and changes in processes, and its unique qualifications—that is to say, its lustre and its inexpensiveness—have opened up new fields to the designer. In weaving and the preparatory operations of winding and warping, considerable experimenting has been done and many of the difficulties have been overcome. There is still much room for improvement, of course, but the limitations and possibilities in these operations are daily becoming better understood.

It is not the purpose of the writer to deal with the preparatory processes, such as spooling, warp sizing, warping, or copping. This article will deal with rayon as a weaving proposition only, discussing the best way to handle this new cloth-decorating material in warp and filling, with a full description of many of the popular rayon and cotton mixtures.

Early Rayon

The writer has been using rayon for the last ten years. When the material was first introduced in New England mills, it was of very poor quality and much difficulty was experienced in weaving the single rayon as warp. It was full of knots and would not stand the friction of the reed. This was due to the poor thread and imperfect sizing. As a matter of fact very little, if any, sizing was used when the material was first introduced. The only way in which the threads could be woven successfully as warp was by doubling or making a two-ply thread.

This made the cost of the material almost prohibitive, because the only size or count that could be made successfully was the 150 denier. That is to say, this was the finest count or size. The coarser sizes could be made, but the use of only a very small amount of the coarser sizes made the cost of the cloth too high. A 150 denier rayon equals about a 35s cotton, and the two ply 150 rayon equals around a 17½s cotton. This is the main reason why rayon was slow in becoming popular. The poor weaving qualities of the material kept the production down, and weavers did not take kindly to the new fibre. Furthermore, the mills were not over anxious to fill up their looms with a material that was in the experimental stage.

Rayon could always be handled fairly easily as a filling proposition; but, in order to get the best results, it was necessary to weave it on a box loom, and the general expense of operating a box loom is much higher than that of an ordinary fancy loom. After the cloth was woven, great care had to be exercised in the washing and bleaching, for this material was new to the finisher. Much cloth was spoiled on account of the lack of knowledge of how to handle the material in the finishing. The first of these cotton and silk mixtures sold readily on account of the appearance of the fabric; but, when shirting and dress goods were handled carelessly in the laundries, the rayon did not last long.

Now Improved

The rayon of today is a far better material than the rayon of a few years back. The material will stand washing almost as well as cotton, and the rayon and cotton mixed fabrics will

and up under finishing much better than will the cotton and natural silk mixtures. The rayon of today will weave just as well as will the natural

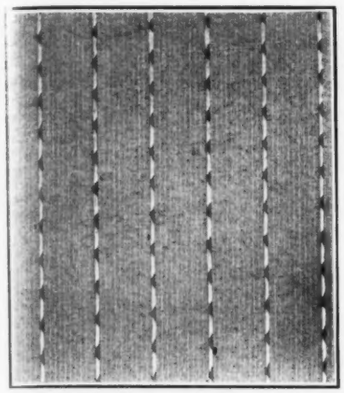


Fig. 1. Rayon on Colored Cotton Stripe Ground

silk, both as warp and filling. Improved methods of manufacturing and sizing make it possible to use rayon as warp with no more difficulty than would be experienced in the weaving of natural silk.

Rayon cannot be handled just the same as the cotton yarn, but this does not mean that a special loom or any very special equipment is required for the loom. It can be woven on the ordinary cotton loom, but must be handled, both as warp and filling, in a somewhat different manner than that in which cotton is handled.

The Two Types

It is the purpose of the writer to tell of his experience with the new decorating material. At the same time, he will assure the inexperienced weaver or designer that there is nothing to fear in the use of either of the two main classes of rayon; that is, either the regenerated cellulose or the acetate cellulose. One is as good as the other, either as warp or filling. It is practically impossible to tell them apart when woven into cloth, unless one or the other is tinted with some fugitive dye. Celanese (an acetate cellulose) is usually tinted during the sizing of the material for warp purposes, and the filling is sprinkled with a fugitive dye so there will be no mistake or danger of mixing one rayon with another when using the two distinct kinds in the same weave room.

For the benefit of those who do not know the peculiar properties of celanese, as distinguished from viscose and similar rayon, we will say that celanese permits of cross dyeing just the same as natural silk, while the other rayon does not. Celanese possesses other peculiar and valuable properties which it is not the writer's purpose to discuss.

Below is presented a list of the cotton and rayon mixtures that are now being made in the cotton mills of New England and the South, using both carded and combed cotton. The writer does not claim that the list is complete. It is the extent of his experience, however. The names of the cloths given below refer to the ground cloths only, decorated with rayon stripes or checks, and also hard twisted cotton yarn as warp or filling with rayon warp or filling for crepe.

Fabrics with Rayon

The list is as follows: Lawns, voiles, cotton pongees, organdies, madras shirtings, broadcloth shirtings, material for waists, corset and brassiere cloths, curtain material, bedspread covers, draperies of every description (particularly marquisettes), handkerchief cloths, pajama cloths, umbrella cloths, and crepes with cotton warp and rayon filling. Up to about one year ago most all of the madras shirtings were made with rayon stripes. The demand for shirting cloth decorated with rayon stripes has fallen off considerably—not on account of any defect in the material, but because the market for this kind of cloth became practically glutted

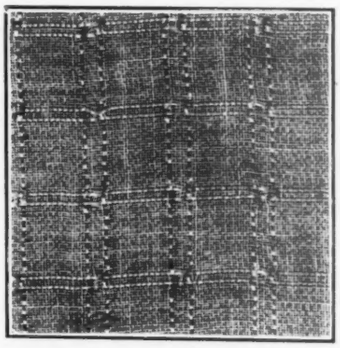


Fig. 2. Rayon-Checked Voile

with rayon striped shirts. There is now quite a demand for broadcloth shirting decorated with rayon stripes and checks, using both colored and gray rayon. There is a big demand for voiles decorated with colored rayon in stripes and checks.

Brassiere cloth with rayon stripes and checks is now being made in very large quantities. In fact, the demand for this cloth is almost greater than the supply. It is of rather heavy construction and few mills care to accept very large orders, for it is rather difficult to handle, requiring much care in the preparation of the yarn, both rayon and cotton. Voiles, decorated with rayon stripes and checks, are easy to handle on account of the light sley and pick. Cotton handkerchiefs are now being made with a few threads and picks of rayon in the borders. Some beautiful effects are produced on handkerchief borders by the use of very little rayon.

The greatest use of rayon as a decoration for a cotton cloth has been in the weaving of drapery cloths of every description. Included in the drapery cloths are bedspreads or bed coverings. It is in this type of cloth that rayon has shown up to the best advantage. The decoration of these cloths has been mainly in the filling patterns. Gray and colored 150 and 300 denier are the popular yarns for this purpose. The construction of drapery cloths is usually light in the sley, around 48 x 56, using either 30s or 40s sulphur-dyed warp and either gray or direct color rayon filling.

Drop Box Loom

In most all cases a drop box loom is used, on account of the uneven shades in the gray or colored filling. Inserting the picks in two and two order mixes the off shades, and the imperfections cannot be seen so readily. This seems to be the one great drawback to the use of rayon in the ordinary dobby loom, either in the gray or colored state. The use of the dobby loom would lower the cost of production, but the converters will not take chances, even if the weave is plain. Most all the contracts for this type of cloth specify that the goods shall be woven on a box loom.

Marquisettes, woven with the gray rayon do not show up the uneven shading as do other cloths; but, if woven with colored rayon, the uneven shading shows up plainly unless woven on a box loom and the picks inserted two and two. Ripplette bedspread covers are usually woven on a dobby loom because the heavy warp construction and the seersucker stripes cover up many of the defects in the filling.

Friction in Shuttle

Correct friction is very important when using rayon as a continuous filling, not because of the danger of the so-called shiners but because of the danger of the filling sloughing off as it unwinds from cop or pirn. The friction should be so placed that it

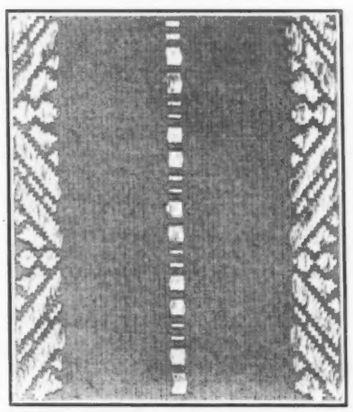


Fig. 3. Rayon Stripe on Brassiere Cloth

will control the filling as it unwinds from the cop from the very beginning to the end of the unwinding—that is, until the cop or pirn becomes exhausted. This is not hard to accomplish, and it is usually done by the use of slasher cloth so placed in the shuttle that there is a slight pressure on the unwinding filling from the beginning to the end of the cop. Many weavers use either cat, muskrat, or rabbit skin, in the same manner that these friction agents are used in the shuttle when weaving natural silk filling.

Rayon filling is a great deal heavier than the popular sizes of natural silk filling, particularly the 300 denier rayon. This equals about 17½s cotton. It is a very heavy filling thread and is hard to control. No matter how carefully it is wound on the tube or pirn, it will have a tendency to run wild and to slough off in lumps, unless the correct friction is used. Friction placed at the mouth of the shuttle is of very little use. It must extend from the beginning to the end of the cop or pirn. This is very important. It is not necessary to apply much pressure, because the sloughing off is usually from the greatest diameter of the cop or pirn. This sloughing off and the necessity of a large amount of friction material in the shuttle have been serious handicaps to the use of rayon in the semi-automatic loom.

The ordinary feeler has been another handicap to the use of either rayon or natural silk in this type of loom, but this has been overcome by the adoption of the new type feeler. This new type of feeler is termed the intermittent feeler, and the weaving of rayon on the semi-automatic loom would be a practical proposition if the uniform lustre of the filling could be relied upon. This new type of feeler strikes the filling at certain intervals only, and not enough to injure the filling threads. It is a great improvement over the old type push or sliding feeler, but is not a necessity if using only cotton filling.

Widening the Dent

When weaving rayon as warp, it is not practical to reed many ends per dent. Rayon, like natural silk, will stand quite a pull, but is very susceptible to friction. When weaving voiles with rayon warp stripes, two ends of the 150 denier rayon per dent is the limit, and the rayon must be well sized or the silk threads will fray and ball up behind the reed. It is good practice to pull out one wire so that a larger space will be available for the rayon threads. This makes the reed useless for any purpose other than the contract on which it is being used; but the price of reed does not mean much when compared with the improvement in the weaving, with the consequent better production and quality. Practical weavers do not hesitate to pull wires from the reed.

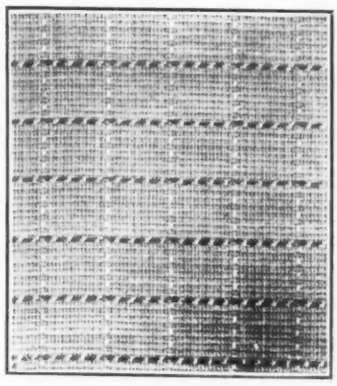


Fig. 4. Rayon Check on Jersey Cloth

They know that it means little extra to the cost of the cloth as compared to poor weaving and low quality cloth. Much trouble can be avoided if suffici-

ent space is given the silk warp.

Most of the madras shirtings are woven with a backing of cotton warp, the silk being drawn two ends per dent with two ends of the cotton in the same dent. The silk ends are usually drawn as singles and the weave is usually of a character that will show as much of the silk on the surface of the cloth as is possible. The silk intersects with the cotton filling at long intervals and is not subject to much friction. It is usually drawn on a separate set of harnesses; and the correct way to set these harnesses, carrying the silk, is to have them rise higher than the harnesses that carry the cotton threads. In this manner, the silk is kept away from the cotton when it is on the top shed and only touches the cotton threads when weaving into the cloth.

This method of setting the harnesses eliminates a lot of friction which would otherwise occur if the silk were on the same level or below the cotton threads used as a backing. These cotton backing threads are usually woven in plain order. It is the only practical way to handle rayon when weaving this material as a shirting decoration. When weaving rayon with a plain cotton backing, it is good practice to weave two picks between the rise and fall of the silk in the pattern. Otherwise the silk will lay irregularly on the plain backing.

Colored Stripe Backing

Fig. 1 shows madras shirting cloth with the silk woven over a stripe of colored backing, the cotton weaving plain and the silk floating. Not all the shirting cloths are woven in this manner. Some are woven with solid silk stripes, particularly the rayon-decorated broadcloth shirtings. The ground of this type of shirting is usually woven three ends per dent, and the reed is not so fine as that used on the voile ground. The weave of the solid silk stripe is a long float twill, a sateen, or a fancy, and the ends are usually drawn two and not more than three per dent. Even when using a coarser reed than is used on the voile ground, it is good practice to pull one or more wires from the reed according to the width of the stripe, to prevent the fraying of the silk warp.

Fig. 8. Rayon-Filled Seersucker Stripe Drapery

Silk decorated broadcloths are not a difficult weaving proposition, for the picks per inch rarely exceed 72. The majority of these cloths are woven with 68 picks per inch. Silk stripes on broadcloth grounds are usually woven solid, because the ground of the cloth is of a very close texture, and if the silk is backed with gray yarn it will be overshadowed by the ground. If the plain backing is of colored yarn, the silk shows up strongly. It is not necessary to use as much silk for decoration when a colored plain backing is used.

Voile Check

A voile ground is very popular for rayon-decorated stripes or checks. Fig. 2 shows a rayon-checked voile that is very popular and is a very good seller. Not very much silk is required to give a good effect on a voile ground; because this type of ground, being very light and of an open character, does not overshadow the silk decoration. In all cases, the silk should be drawn alone in a dent of the reed. A voile reed is very fine, and the silk is liable to fray and ball up behind the reed. It is not good practice to draw any ground ends in the same dent with the silk when using a voile reed. If two ends of 150 denier silk are drawn in the same dent, it is good practice to pull out one of the wires. When this is done, the two ends of silk and one end of the ground yarn will occupy the space of two dents. The removal of the one wire allows these three ends to work freely, and better weaving is the result.

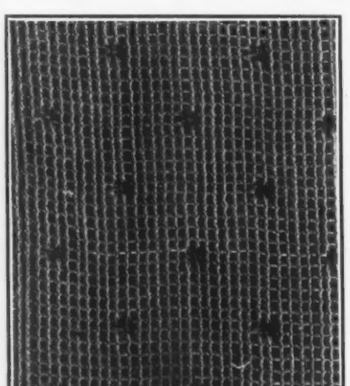


Fig. 7. Fancy Spot Marquisette with Colored Rayon Filling

It is good practice to draw the silk ends on separate harnesses, so that these harnesses can be staggered. The ends will then be separated when they are passing each other in the reed. This method of weaving is useful when using any kind of silk where the ends are drawn more than one per dent on a voile reed.

Brassiere Cloths

Brassiere cloths are often termed corset covers. Most all of these cloths are now woven with artificial silk decoration either as stripes or checks, or are woven on jacquard looms using 300 denier artificial silk for the filling. It is cheaper to weave these cloths on dobby looms using silk stripes for the decoration. The ground of the cloth is of a rather heavy construction, usually 30s warp and about 15s to 20s filling. The ground weave is plain; that is, the ground of the cloth from selvage to selvage is woven plain, and the decoration, whatever it happens to be, is additional and woven over the plain ground. When the decoration is in stripes— and this is the most popular decoration for these cloths—the silk is drawn in the harnesses, one end of silk and then one end of cotton.

If the ground of the cloth is drawn two ends per dent, there will be two ends of silk and two ends of cotton per dent. All these ends are drawn in separate heddles. Many of these cloths are reeded three ends per dent in the ground, and this makes the weaving much easier on account of the greater space between the reed

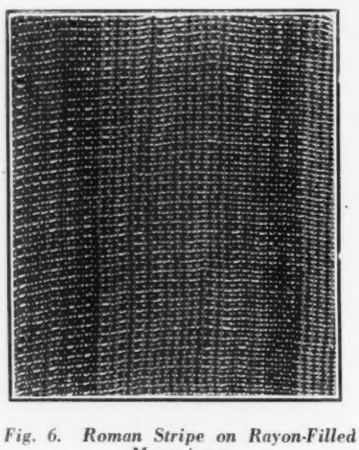


Fig. 6. Roman Stripe on Rayon-Filled Marquisette

wires. The patterns for the rayon decorated brassier cloths must be of such a character that little of the silk shows on the back of the cloth. Most of the buyers insist on having most of the silk on the surface, on account of the extra heavy ground.

Fig. 3 shows a rayon-striped brassiere pattern. The warp in this cloth is drawn two ends per dent—that is, there are two ends of cotton and two ends of silk in one dent. Where the silk is drawn in the reed, every other wire is pulled so that for every space in the reed, where the silk is drawn, there will be four ends of cotton and four ends of rayon. This makes the weaving of the silk much easier; and, on account of the silk weaving mostly on the surface of the cloth, the reed marks cannot be seen except on the back of the cloth.

There is a big demand for this fabric. It has always been a very good seller, but is in greater demand at the present time on account of the beautiful effects produced by the introduction of rayon, either in the warp and filling. A certain breaking strength of the cloth is one of the requirements of every contract. This breaking strength is required in the warp and the filling. The buyer is very insistent on this requirement, and for this reason the very best of cotton yarns should be used in the construction of this popular fabric.

Jersey Cloth

Jersey cloth is another popular fabric for which there has always been a steady demand since its introduction. The yarns used in the cloth and the character of the weave make it a very desirable cloth for underwear

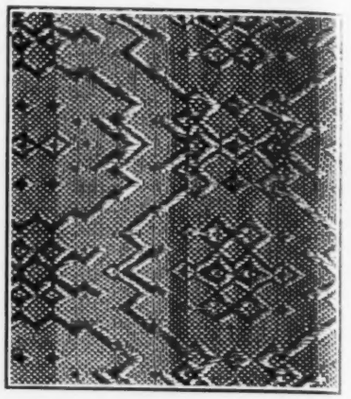


Fig. 5. Fancy Rayon-Filled Drapery with Roman Stripe

purposes. It is the nearest approach to a knitted fabric that can be produced on a fancy loom, and for this reason it is termed jersey cloth. Rayon checks are now being used as a decoration on this fabric and it is finding a ready sale.

Rayon introduced as checks adds quality to the cloth. The small number of harnesses and the easy weave make this fabric a good weaving proposition for any mill. Stripes as a decoration, unless a large amount of silk is used, are not as popular as checks. Checks can be made with a small amount of silk; and, while they have to be woven on a box loom, the increased cost of operating this type of loom as compared to the fancy loom does not bring the cost per yard as high as the warp decorated cloth. This is because of the small amount of silk used.

Fig. 4 shows a very popular rayon-checked jersey cloth. In all cases where rayon is used as warp, care must be taken to have the rayon spread correctly on the loom beam or spool. This rule applies to all warp preparation where an extra loom beam is used and particularly where silk of any kind is used for warp purposes. There should be no side pull. If the cloth should be 36 in. wide and the ground yarn is dressed on a loom beam with a 44 in. spread, the rayon on the extra loom beam should be spread at least 39 in. wide. Many designers make the mistake of spreading the rayon on the extra loom beam slightly wider than the width of the yarn as it lays in the reed.

Destructive Friction

This would be correct if the loom beam carrying the ground yarn was only slightly wider than the spread of the yarn in the reed; but, where the reed spread is about 38½ in. for a 36 in. cloth there will be an extra spread of 5½ in. of ground warp yarn. If the spread of the decorating material is only 39 in., which is ½ in. more than the spread of the yarn in the reed, the ground yarn on the sides will be constantly pulling and rubbing against the yarn from the extra beam. This kind of friction is very destructive to

any kind of yarn, particularly to rayon or natural silk.

The breaking strength of rayon, when used as warp, is remarkable; but it cannot be compared to well sized cotton where much friction is imposed. On account of the good breaking strength of the thread, many rayon warps are weighted too heavily in the loom, and its value as a decoration is much impaired. The finished cloth will tell the story. In order to secure the full value of rayon as a warp stripe, it should be woven as loose as possible. This helps the weaving and also the finishing.

Where rayon is used in large quantities as warp, the cloth on the loom should be inspected daily. This is not a very difficult or expensive task as compared to the expense of poor quality cloth and dissatisfied customers. The writer feels that, if the rayon filling were sized the same as the warp, there would be better results from the filling and less shiners. It is just possible that the filling is spoiled during the winding on the tube. If the filling were sized previous to copping, there would be less danger of spoiling the filling during the winding. It is worth a trial. While the expense would be greater, the results, if successful in eliminating shiners, would remove the one big drawback to the use of rayon on the plain or fancy loom.

Rayon as Filling

A large variety of cotton and silk mixtures are now woven using rayon as filling only. Draperies and spreads are now made in very large quantities, and the demand is on the increase. Draperies are made with colored stripes, termed Roman stripes. The colors of the warp (cotton) and filling (either color or gray rayon) are direct—that is, they are not fast to bleaching. Draperies are usually of a light sley and pick, which enables the designer to secure very large jacquard effects on a dobby loom. These fancy effects must be designed to show as much of the rayon filling as possible on the surface of the cloth.

Fig. 5 shows a drapery pattern with multi-colored warp and colored rayon filling. The light sley of this cloth makes it possible to secure a large pattern on a small number of harnesses. The filling used is 150 denier rayon and the warp is 40s single cotton. It is necessary to weave this cloth on a box loom on account of the uneven shades in the filling.

Very often the mill will have a large amount of uneven shades of filling on hand. The only way in which this can be used up is to make samples using two picks of one color and two picks of another color. In this manner some very neat effects can be produced, and cloths of this sort have found a very ready sale. It is almost impossible to notice the uneven shades when the picks are woven in this manner and the two colors are widely contrasted. It is a very good way to get rid of a surplus of unevenly shaded filling.

Fig. 6 shows a Roman stripe marquisette with all cotton warp and colored rayon filling. This was woven on a box loom to hide the uneven shading of the filling. Fig. 7 shows a solid color cotton warp and colored rayon-filled marquisette with filling spots woven in small blocks. This makes a very attractive pattern and is no more difficult to weave than is the ordinary marquisette.

Bedspreads

Colored and gray rayon filling enters largely into the weaving of bedspreads. Some of these are termed ripplette-striped covers. These weaves are also used for heavy drapery purposes. One Massachusetts mill has become nationally famous through its product of jacquard woven spreads. These jacquard spreads are woven on wide looms; and they are the full width, or slightly wider, than the ordinary standard-width bed. Many of these spreads are woven on 40 in. fancy looms, and the pattern laid out in such a way that the two selvages can be sewn together so perfectly that it requires a keen eye to note where they have been joined together.

The seersucker stripes (Fig. 8) woven on this type of cloth, are made from an extra warp. This warp is reeded with a double density—that is, there are double the number of ends per dent in the seersucker stripe, usually four ends per dent, while the ground of the cloth where the decoration or figure is woven is one end per dent. Cloth of this type used for drapery purposes is made from single yarns of from 30s to 40s. The cloth woven for window shades is usually made from 2-ply 20s or 2-ply 30s, and the rayon filling is 300 denier. The window shade cloth is of a heavy construction. It is termed Austrian plisse-stripe shade cloth.

The seersucker stripes that are woven into the cloths mentioned above are often termed plisse stripes. This is wrong. The plisse effect, either as a stripe or all-over effect, is produced by mechanical means other than the loom. The seersucker stripes that are woven into the cloths mentioned in this article are not produced by any particular mechanism on the loom. They are produced by reeding the yarn in the stripe at double the density of the ground warp, and weaving the yarn from this extra beam slack. The amount of contraction of the yarn from this extra warp is not governed by an mechanical means. It is governed by the amount of tension placed on the warp beam during the weaving. In most all cases, the filling used is 150 denier rayon for the drapery cloth and 300 denier for the shade cloth. Both colored and gray rayon are used, and the colors are direct or what are termed "sunfast." The cloth is practically finished as it leaves the loom.

Most all this type of drapery or shade cloth can be woven on an ordinary dobby loom. The only place where the rayon filling shows is in the fancy stripe or what is termed the ground stripe. The seersucker stripe practically overshadows the silk filling. Unevenly shaded rayon, either gray or colored, can be woven on this type of cloth without any fear of detection. A very slight difference in the lustre of the gray or colored rayon will show up clearly on a plain ground, for all the picks are covered with the same amount of warp. This applies to all-over fancy grounds.

The plain-woven, rayon-filled cloth is the weave where the uneven shading shows up the worst. The writer is of the opinion that shiners are the result of poor copping. A shuttle will sometimes weave off many cops without showing any shiners in the cloth, and then will receive a cop that will show shiners in some part, while the rest of the cop weaves off all right. This has happened so often that there is now no doubt in the weaver's mind but that the fault is either with the rayon or the manner in which it is wound on the cop.

It is a fact well known to all weavers that the difference in tension or friction in shuttles will make a noticeable difference in the width of the cloth. If shiners were caused by too much friction in the shuttles, there would be a difference in the width of the cloth where the shiners occurred as compared with the width where there were no shiners. The selvages would also show some difference. Actual tests have shown no difference between that part of the cloth where the shiners occurred and that part that was perfect. It is not reasonable to expect the weaver to change the friction for the different cops. If one cop runs off without making any shiners, it is reasonable to expect every cop to do the same. If they do not, it is then obvious that the fault lies either in the material or the manner in which it is copped, and not with any part of the weaver's equipment.

Finishers have met with the same trouble when finishing goods made with all gray rayon filling and cotton warp. Shiners or filling streaks that could not be seen in the gray goods have shown up strongly in the piece-dyed cloth. It has been a case of passing the buck, with the weaver on the receiving end, as usual. Rayon in the gray is far from being a perfect thread as regards evenness of shades in the color or lustre. It is a strong thread both in the warp and filling, and not difficult to weave. The writer has handled both natural and artificial silk in large quantities and is convinced that the defects in the cloth termed "shiners" are not the fault of the weaver.

Mechanical Problems in Knitting Rayon

New Machinery and Special Devices Made Necessary by Peculiarities of Fibre—Winding from Hank to Bottle Bobbin in One and Two Processes—Special Bobbins Without Roughness or Excessive Smoothness—Problems of Stands, Knots, Perspiration, Lubrication, and Knitting Methods

By William Davis

KNITTED goods manufacturers in this country are turning their attention with increasing interest to the production of knitted fabrics in rayon; and it is one of the most significant events of the present textile epoch. A few years ago all were lamenting that the supplies of wool would in a short time be grossly inadequate to meet the growing clothing demands of the populations of the world, and grave fears were expressed regarding the heights to which wool values would mount. Wool prices have risen high enough, but there has been again a serious decline. It has not been stated how much of this decline has been due to the increasing weights of rayon goods being absorbed by the wearer.

In a recent estimate of production of knitted goods in the United Kingdom, it was stated that 40% of the rayon supply was absorbed by the knitting industry in one branch or another. Wool may rise again to a high price, but while it is risky to prophesy regarding the future of wool prices, it is clear that the entrance of rayon so prominently in the picture has rather overshadowed absolute dependence on wool. It is certain that attempts to corner the wool markets which were stated in some quarters to have been made, will in the future be countered by this very important textile material.

Profitable Experiment

The adaptation of rayon to the requirements of the knitted fabric has been by no means plain sailing, and the early pioneers had to suffer great losses and spend much time in experiment before one by one of the difficulties of manufacture were overcome. The great obstacle to successful utilization of the material in a large way was undoubtedly the question of the large proportion of waste

produced in knitting, and even today many manufacturers hold back from taking any part in this trade owing to the great losses which they incur by reason of the waste produced on the machines during the process and the large proportion of seconds which are produced. On the other hand, those manufacturers who brought all their experimental skill to bear on the solution of the difficulties have had no reason to regret their decision and they are in many cases reaping a deservedly abundant harvest for their enterprise.

In several well-known cases, however, the popularizing of rayon as a material for knitted goods was hastened by the producers of the raw fibre themselves. They found hesitation and reluctance on the part of individual knitters to take the trouble of experimenting, and they established such departments themselves with the primary object of popularizing their raw materials and yarns.

Winding Machines

An account may be given of some of the more salient difficulties encountered in preparing and knitting this material and the means which have been adopted to overcome the defects. By far, the greatest difficulties have been experienced in winding the rayon. This trouble did not arise as long as rayon manufacturers were able to supply the yarn ready wound to customers; but, when increasing demand made this impossible for the manufacturers of rayon to accomplish, the knitter had perforce to undertake this work himself. It was soon recognized that the existing standard type of winding machine, although highly suitable for producing bottle-shaped bobbins or cross-wound cones for woolen or cotton fabrics, was entirely unsuitable for winding rayon from the hank, more particularly when dyed. In some cases it has happened that individuals have succeeded in converting existing types where workers of considerable mechanical ingenuity have been available, but the majority have been compelled to install new winders for this work.

Several new types of winding machine are now in use, and a reference to the salient principles may be useful. Certain well-known types are very suitable for producing the evenly wound bottle-shaped bobbins required for the knitting industry, but require an additional machine to bring the yarn from the hank to the double-ended bobbins. In the hank-winding machine, the bobbin winds the yarn from the hank upon itself; and the great advantage is that the drive of the bobbin spindle is not positive, but consists of light frictional contact with the driving roller. In this way, when a catch occurs in the hank, the thread does not break, as nearly always happens in the rigid drive of the older machines. The simple catching of the thread in entanglement is sufficient to stop the bobbin revolving until the worker can free the hank once more.

In this way, a large number of knots are avoided and the yarn can be kept unbroken from one end of the hank to the other. It incidentally reduces waste, because nothing gives a worker more loophole for waste production than the tying of knots. In this connection, however, it should be stated that the methods of dyeing rayon are under very critical review at present, as it is found that many dyers deliver the colored yarn to the manufacturer in a very matted state, and considerable additions are made to the working costs by the slow progress which is possible even on the best machine, owing to frequent trappings. In some cases, the reduction in output per winding machine operator has been as much as 75%, and this greatly increases the cost of manufacturing the material. Manufacturers find that skill in the handling of rayon differs among various dyers, and they are transferring their allegiance to those who have acquired a reputation for giving least ravelling of the hanks. By the method described, the double-ended bobbins are next placed on the ordinary form of bottle-bobbin machine and wound at the very rapid rate associated with such machines.

Single-Process Machines

The knitted goods manufacturer, however, will do well to examine the claims of several types where the winding operation is performed at one operation, for if it can be done satisfactorily on this system it saves (a) troublesome handling, (b) increased space essential for new machines, and (c) two different sets of workers.

The most successful single process machines have a number of features in common, the outstanding being the stop motion which is brought into work when the hank becomes entangled and the free passage of the thread impeded. This reduces breakage of the material, for arrangement is made to bring the spindle to a standstill not only when the thread actually breaks, but when it is drawn tight by an entanglement of the hank. The build of the bottle-bobbin is, in ordinary machines, effected by a wheel, the rim of which comes into contact with the yarn level when it reaches a certain height, and thus pushes round the spiral, which causes it to mount higher on the spindle. The disadvantage of the contact system is that it entangles the layers of rayon. New machines have this wheel very slender in character, so that the contact is the lightest possible. In one important type, the system of building the bobbin is rendered entirely independent of the contact with the yarn on the bobbin. It has a simple gear for building the bobbin automatically, which produces very level results and no ravelling.

Special Bobbins

Experience proves that rayon demands greater attention to the make of bobbin than is required for other materials, and the products of the factory joiner are not at all suitable for the work. For the coarser counts of woolen and cotton yarns, such bobbins may be all right; but, for a fine filament like rayon, the bobbin must be built for the job. There are many reputed bobbin makers in the United States who can be relied upon to give bobbins in most respects suitable for the work. Although the initial costs may be higher, these will soon be returned with high interest to the manufacturer in the shape of reduced waste material and a greater knitting efficiency.

The usual bobbins become chipped in course of work and it is absolutely essential that bobbins for this work should be handled with zealous care. Any chips or rough places developing during work should be sufficient to command their replacement. The ribbed formation usually covering the inclined portion very often displays a slight roughness which ordinary yarn will pass but which traps the rayon in a way to cause slurgalls in the fabric. Another defect which must be avoided is the covering up of such roughness carelessly with a cheap stain or varnish. Rayon is often wound in a damp condition, and this acts on unsuitable varnishes, so that the last few inches of yarn are stained with a powerful chemical substance which ruins the appearance of a fine fabric. The rayon bobbin should be well balanced when on the spindle of the winding machine. Any wobbling should be at once checked, and the opening through the inside of the tube should fit the spindle exactly.

Bobbin Coverings

At the present time, the inventors are busy in overcoming the disadvantages of an excessively smooth bobbin and also in remedying the defects inherent in the wooden bobbin. Certain celluloid substances, akin in some cases to the chemical composition of rayon itself are being used to cover ordinary wooden bobbins to make them immune from chipping. These celluloid casings cover the wooden base completely, and the substance is so hard that the bobbin can be hammered against a hard surface without breakage or indentation. The examples examined by the writer have covered the level part of the bobbin all right, but difficulty has been experienced in getting the perfect join to the inclined portion, an opening or rough edge being formed which traps the thread as it is coming off.

In ordinary bobbins it is often found that the last few inches of yarn come off in a mass, causing press-off on the machine and much waste. One method is to watch the bobbin as it empties and to pull off by hand the last few inches as waste. Obviously this only works when the operator is very vigilant and it tends to reduce the number of machines which can be controlled by one worker. Several devices are now being tried out in the direction of covering the bobbins with rougher material which offers slightly increased resistance to the last layers of rayon as they are being drawn off. In another case, the bobbin is covered with felt in which ing drawn off. In another case, the bedded to some degree, and this acts as a drag on the thread. Unfortunately, the felt often holds the yarn too firmly, and this has been supplemented by a spiral wire over the felt which makes the delivery easier. Obviously this is not the last word to the problem and a good reception awaits the inventor of a device to overcome these difficulties.

Stands and Knots

It often happens in knitting that a length of yarn in excess of the amount required hangs loose, and, slipping down, becomes trapped under the rim of the bobbin on the stand. To correct this, one method is to adopt stands on the machine which exceed the diameter of the bobbin base, for the thread then rests on the stands until it is drawn up into the fabric. Even then, however, it often gets trapped, and it is an advantage to have the stands for the bobbins shaped like cups, so that the thread rests momentarily against the sides and no trapping takes place.

The tying of knots in rayon has been a very troublesome point and has caused great annoyance, tantalizing as one of the minor pin pricks of the process. Splicing was tried for a time where an attempt was made to imitate the sailor as he unites two ropes by unraveling the ends and splicing the loose strands into each other. This has the advantage of reducing the size of the knot so as to render it almost imperceptible, but its manipulation has proved too tricky to render it a practical proposition for the "very human" beings found in our winding rooms. One drawback to this is that it entails increased touching of the material between the soiled fingers of the hand, and this, combined with pressure, often leaves a stain in the rayon which cannot be eradicated by the most careful finisher.

Perspiration

The material seems to have a great affinity for grit plus perspiration, and holds it tenaciously against the ordinary scouring methods. It should also be mentioned that workers who perspire profusely in the hands are quite unsuitable for employment in a rayon department, as a good many of these minor stains and dirty marks can be traced to such workers, of which every textile mill has its quota. It sometimes happens also that when a member of the regular staff falls ill or is run down in health, the skin exudes substances which find a firm lodgment in the rayon.

This is only one illustration of the principle that, to insure success in this branch, the standards of personal cleanliness among the workers must be high, and the rough, banging methods often adopted in handling other textile yarns cannot possibly be extended to rayon. Workers should be specially selected with a mental

outlook in tune with the nature of the material they are dealing with. The development of this similarity of spirit between worker and material, so to speak, is of the utmost importance. Refinement of touch and treatment must be developed in the personnel. Machines must be more regularly cleaned and rigorous lookout maintained for grease drippings, grit and dust, and a higher standard of cleanliness of department must be insisted upon.

Knitting Machines

If these preparatory points are successfully solved, the way is largely clear for successful knitting of the material; but the actual working on the machine also presents certain difficulties. It is usually unnecessary to install new machines, because existing types can generally be adapted to the work. Some reserve must be imposed here, however; because the buyer of rayon fabrics is becoming increasingly discriminating in his taste and is developing a critical eye for perfection of fabric texture.

The ordinary machines can be used with certain adaptations, but the cult for fine textures is increasing so rapidly that manufacturers are in many cases being compelled to install special types of fine gauge machines to cope with this demand. Ordinarily machines often have difficulty in knitting the material owing to the "jumpy" character of much of our rayon, which in many cases requires to be specially softened either on the knitting machine or on the winder.

Lubrication

A very successful substance which can be used for many purposes is the ordinary soft soap and oil emulsion, which is located in a trough in front of the winding machine. The winding thread runs over a roller which rotates in the liquor, and in this way it becomes lubricated. One drawback to this system is that the material has to be worked immediately on the machine before the emulsion dries on. Furthermore, irregular results sometimes develop, because on exposure to the air the outer layers become dried, and the lower layers of material hold a large proportion of their moisture. This develops irregular results in knitting—the damp portions having varying physical properties which affect the working of the fabric and induce irregularities.

In many cases, knitting machines are being fitted with bottles containing the lubricant or softening agent, this being taken by the yarn as it passes over a wick immersed in the lubricant. Pure olive oil is also popular for this purpose. It is more expensive, but has the advantage of being easily removable in scouring, and it does not go rancid on the material. Various patent substances are on sale for this purpose. Some of these are satisfactory; but others are of strong chemical constitution and should be eschewed as giving rise to troubles in subsequent finishing operations. Incidentally a number of curious stains and blemishes in the dyed article undoubtedly have their root in fancy agents employed for softening.

Mechanical Changes

Lubrication is a very messy process and manufacturers try to do without it wherever possible. One method is to aim at greater control of the thread in the knitting machine. We have seen improved knitting ensue by a simple adjustment of the thread guide through which the thread passes on its way to the bobbin. Smaller guide openings are an advantage in that the play allowed the thread is reduced. In some cases, it is also possible to raise or lower a guide so that the ballooning produced gives less knocking against the sides of the bobbin when the thread is being drawn off.

In most cases of existing machines it is found necessary to make a slight adjustment of the stitch cams, for the knock-over of the loop is rather sharper than that for cotton or for wool. In general, stitch discharge requires to be sharper and quicker in action. The mechanic can obtain this result by filing the point of the ordinary cam; or the machine builders will supply cams for rayon knitting which can be made to replace the existing shapes. By experimenting in this way with the cam, it is often possible to get a better control during knitting and prevent the tendency of the rayon to disport itself on the needles. The cotton should be short, sharp and decisive, without lingering or discursive factors.

The Dyeing of Rayon Hosiery

Difference in Dyeing Properties of the Various Types of Rayon—Suitable Equipment for the Processes—Methods and Dyes for Each Type—Finishing, Drying and Boarding—Notes of Value Concerning the Dyeing of Full-Fashioned Hosiery—General Discussions

By Herbert C. Roberts

CELLULOSE is capable of being tri-acetated and tri-nitrated. Before the tri-nitrated types of cellulose products are suitable for use as fibres, they are further treated so that chemically they are regenerated or hydrated cellulose derivatives. We therefore have two main classes of rayon based upon their chemical structure. Under the two main classes will be listed the various common brands, and it will be shown why the dyer should know which kind of rayon he is working with.

Regenerated Cellulose

The hydrated or regenerated cellulose group includes (1) Chardonnet or nitro-cellulose, (2) viscose, (3) cuprammonium, and (4) thiocyanate (not on the market as a commercial success at present).

(1) The Chardonnet rayon is the oldest type, and is made by nitrating cellulose and dissolving the product in alcohol-ether mixture. This is coagulated in water and is subsequently denitrated in a dilute acid bath. It contains traces of nitrogen which we see later is an important factor in dyeing rayon produced this way.

(2) The viscose rayon is an alkaline xanthate of cellulose prepared by dissolving mercerized cellulose in a caustic alkali and carbon-bisulphide. This solution is ripened until it reaches a certain viscosity and is then spun into the proper setting bath.

(3) The cuprammonium rayon is prepared by dissolving cellulose in an ammoniacal solution of copper oxide. It is then forced through the spinerette tubes into a prepared setting bath. These spinerette tubes are a number of minute orifices through which the jelly mass is forced under pressure. These tubes imitate, as far as mechanical means can, the way a silk worm spins a silk thread.

The acetate-cellulose group includes (1) lustron and (2) celanese. Lustron is an American product. Celanese is a British product which is now made in America. They are made by dissolving cellulose in a solvent containing acetic acid. The solution is then spun into the proper setting bath. These two products differ in some respects—chiefly in their reaction with basic colors.

Identification of Rayons

Mr. A. K. Johnson of the Lowell Textile School has published a very complete method for identifying the various types of rayon. It would be well for every dyehouse using rayon to have his methods at hand. The only method I shall quote is the method for distinguishing between the cellulose-acetate types and the hydrated or regenerated types. In quoting, I have purposely changed the word "silk" to "rayon," as the word "rayon" was not officially adopted at the time of his writing.

"The burning test serves very clearly to distinguish the acetate rayon (lustron and celanese) from the regenerated (hydrated) cellulose (nitro, cuprammonium, viscose). The fibres to be tested may be twisted into a tight wad and then cautiously approached to a match flame, without being brought into actual contact with the flame. Under the influence of the heat, acetate rayons are seen to melt or 'fuse' back, forming a black knot or globule at the end which precedes the small, sputtering, relatively slow-burning flame down the thread. If the flame is extinguished and the knob cooled, this will be found to be somewhat hard and resistant to crushing. The regenerated (hydrated) cellulose rayons do not melt back, but burn quietly and readily like bleached cotton fibre. The odor from the fumes is the same as that coming from burned cotton. This serves to distinguish the two general classes and can be made upon a very small amount of material."

Too much emphasis cannot be placed upon the importance of the dyer knowing whether he is dealing with an acetate rayon or a hydrated cellulose. These two types of fibres have different affinities for dyestuffs. In fact, the acetate rayon has no affinity for most of the common dyes used in dyeing cotton, wool, and silk.

A prominent dyer of rayon states that the world's production of rayon is divided as follows: 76% viscose; 18% Chardonnet or nitro-cellulose; 5% cuprammonium; and 1% acetate. The dyeing of rayon hosiery will be discussed in this order.

The general properties of all the various fibres make the dyeing problem one of unusual care and intelligence. All rayons show a marked loss in tensile strength when wet. This is more pronounced in some types than in others. It is well for the dyer in cautioning the help to consider it all extremely delicate. High temperature either wet or dry has a detrimental effect. Prolonged dampness will seriously impair the strength of the rayon. The thermometer is as important to the dyer of rayon as the typewriter is to a stenographer. The temperature of the dyebath should be watched very carefully.

Dyeing Equipment

Full-fashioned hosiery when dyed in the yarn is called ingrain hosiery. It may be dyed after the stocking is knit. Black hosiery is the most common that is dyed ingrain, but the other darker colors can be and often times are so dyed. Light, delicate colors are usually dyed after knitting. When the colors do not go on evenly or the correct shade is not obtained in a reasonable time, it is well to put the rayon into black. In this manner, the life and other properties of the rayon are not impaired. There is so much black hosiery worn that a manufacturer is seldom left with a quantity of black hose on his hands for any length of time.

When rayon is dyed in the yarn for producing ingrain hosiery, it is usually dyed on sticks in an open kettle. Since, as stated before, rayon loses much of its tensile strength when wet, it must be handled carefully. Rayon

yarn is largely dyed in the open kettle. Wooden kettles that are suitable for dyeing cotton, wool and silk are not smooth enough to dye rayon yarn. Copper lined kettles and bamboo sticks are used frequently.

Suitable equipment consists of a monel metal kettle and sticks made of hard rubber or bakelite. The sides of this kettle and sticks of this nature are extremely smooth and offer no opportunity for the delicate fibres to become caught and broken. It has been said that the speed of the subsequent winding and knitting of rayon after dyeing is proportional to the length of time and the amount of handling the rayon has received in the dyehouse.

After the rayon skeins are dyed, they are washed and oiled with a small addition of a sulphonated oil and an emulsion of olive oil and soap. This assists in the subsequent winding. The yarn is then extracted. A small number of skeins, say 5 to 10 lbs. are wrapped in a sheet of fine muslin and placed in the extractor. The placing of the material in the extractor wrapped in cloth saves the fibres from distortion and the possibility of breaking by getting caught in the perforations of the extractor.

The hosiery that is dyed after knitting is dyed in lots of 100 to 200 lbs. A common type of machine is of monel metal and is fitted with steam pipes for heating the liquor. It has a quick opening lever-gate valve for draining. The cylinder is of monel metal and is divided into four one-quarter section compartments by a monel metal partition. Each compartment is fitted with a solid monel metal door. The machine can be entirely closed by a solid monel metal tank door which prevents the escape of steam. The machine is fitted with a special dye-feeding device and has a special, easy-reading mercury thermometer.

Dyeing of Viscose Rayon

Viscose rayon is very commonly used in hosiery. As it is a hydrated cellulose derivative, it is very sensitive to alkalies, especially hot caustic alkalies. It is fortunate, indeed, that viscose rayon is very absorptive and takes up dye very readily from even a cold bath. Viscose rayon may be dyed with direct cotton colors, basic colors, and some sulphur and vat colors. The choice of dyestuffs from the various classes of dyestuffs is very important. Only those dyes that have good level dyeing properties should be used.

Viscose rayon enjoys an intermediate place between Chardonnet and cuprammonium in its absorptive power of dyes. The chief fastness requirements of hosiery are those of washing and crocking. The secondary fastness requirements are those of light and perspiration. The basic colors are faster when dyed on rayon than when dyed on cotton. Pale and light medium shades are dyed without a mordant, but the darker shades are dyed after mordanting with tannic acid and tartar emetic.

The general method of dyeing the direct cotton or substantive colors (as they are often called) is to wet the goods out in water at 100 deg. F. To this may be added a small amount of soap or sulphonated oil. The latter is used if the water is hard. The sulphonated oils are not broken down with lime as readily as are soaps. The goods are then dyed in a short bath (20 to 1) for one-half hour, with the addition of 5% to 20% glauber salt. The temperature should be kept between 120 and 140 deg. F. Light shades are dyed more level if 1% or 2% of soda ash and 5% soap are added to the dyebath.

Most direct cotton colors are made faster by after-treating the hosiery with formaldehyde, copper sulphate, potassium bichromate, or acetic acid, either alone or in combination. They have a tendency to dull the shade somewhat. Many of the direct cotton colors contain an amino group and are therefore capable of being diazotized and developed with the various developers, such as beta napthol, meta phenyline diamine. They can also be coupled with paranitraniline, alphanapthilamine, etc. The colors so treated are very fast to washing. The direct cotton colors that can be developed are usually used to produce dark shades.

Sulphur and Basic Colors

Some sulphur colors are used to dye viscose rayon. The sulphur colors that are used are the ones that are soluble in small amounts of sodium sulphide. These are dyed in a bath of 25 to 1 ratio. The bath is charged with 1% to 4% of soda ash, and the material is worked for one hour at a temperature of 100 to 120 deg. F. After dyeing, the goods are rinsed well and soaped in a luke warm bath. They are then washed and given a mild sour with acetic acid. This will stop the action of any residue alkali from rotting the fibre. When rayon is dyed with sulphur black, it has been found advantageous to after-treat the goods with sodium acetate or formate in the proportion of 1 lb. of the salt to 10 gals. of water.

Basic colors are used quite extensively on rayon. For fast results on heavy shades, the goods should be mordanted with tannic acid and tartar emetic. The usual method of procedure is to steep the goods in 5% tannic acid and 1% hydrochloric acid five hours at a temperature of 140 deg. F. They are then squeezed or extracted in a hydro-extractor without previously being washed. The mordant is fixed on the goods by passing them into a 1% bath of cold tartar emetic. They are then washed and dyed. If faster colors are wanted, it is well to mordant the goods after dyeing exactly in the same manner as previous to dyeing.

Basic colors are often used to top direct cotton colors. The substantive color acts as a mordant to hold the basic color on the fibre. Topping is generally employed to make the substantive or direct cotton color brighter.

Vat colors have been used, but the necessary alkalinity of the bath forms a drawback.

Dyeing Chardonnet Rayon

The Chardonnet or nitro-cellulose type of rayon is generally dyed with basic colors. There is always a certain residual amount of nitrogenous matter in rayon produced by the Chardonnet process. This seems to give the fibre a pronounced affinity for basic colors. The rayon may or may not be mordanted. Faster results are obtained by mordanting. Mordanting after dyeing, except for heavy shades is sufficient. The mordanting and dyeing is done the same way as for viscose. All the precautions for handling the viscose fibre apply to this type also.

Chardonnet rayon does not show as good affinity for the direct cotton colors; and these are not used as much as on the viscose. Sulphur colors are used on Chardonnet rayon, and the same treatment as for the viscose fibre is employed. The after-treatment is a little different. Chardonnet rayon should never be soaped.

Cuprammonium Rayon

The cuprammonium type of rayon is opposite in character to the Chardonnet rayon. It shows less affinity for the basic colors and more marked affinity for the direct cotton colors. Sulphur and vat colors are used on cuprammonium rayons but the alkalinity must be kept at a minimum. The temperature must be kept a little lower. In dyeing this type of rayon, it is well to use more dyestuff and dye the material in a shorter time with less alkalinity in the bath. The luster of this rayon is impaired by the use of too much alkali.

Cellulose Acetate

A relatively small amount of cellulose acetate rayon is used in the manufacture of full-fashioned hosiery. Up to two years ago it was used principally to produce white thread effects. It shows very little affinity for most of the common dyestuffs. A few of the basic colors will dye this type of rayon. Chrysodine, new methylene blue, capri blue and nile blue are the most common of these dyes of the ordinary so-called dyestuffs that are used for this purpose.

Attempts have been made with varying success in dyeing acetate cellulose to partly saponify it with an alkali. It then has an affinity for many common dyes. This method at its best is difficult to control. One enterprising manufacturer of cellulose acetate has produced a line of dyestuffs especially suited for dyeing his product. They are not water-soluble dyes, but are soluble in sulphonated oils. The original dyes and many of the later colors produced were found to be soluble in sulphoricinoleic acid. The dyeing is a problem in physical solution rather than chemical. The coloring matter becomes a solution of colloidal dispersed particles. The color enters the dyebath in this condition and becomes an integral part of the fibre. The manufacturers of these fibres and colors have them patented and they can only be used on their material and in their processes.

Finishing and Drying

After rayon is dyed, it is often given a finishing bath to enhance the luster and feel of the hose. Nearly every dyer and finisher has a particular formula for this purpose. The finishing compound as a general rule consists of putting a film of oil on the hose. This brightens the color and imparts the desired feel and handle to the goods. It likewise adds more lustre.

Soaps and sulphonated oils are largely used to carry the oil, which may be mineral or vegetable. The vegetable oils are not recommended, as they are apt to turn rancid upon storing the hosiery. Soaps and sulphonated oils make good emulsifying agents for the other oils. Paraffin oils are largely used in this manner. A crispness is imparted to the goods by the addition of small amounts of glue and other sizing agents. This is also accomplished by entering the goods, containing a little soap, into a bath of organic acid, such as acetic or tartaric acid.

The goods are taken from the finishing bath without further washing, and extracted. The extractor should be loaded and unloaded very carefully to avoid tangles and damaging the goods by undue stress and strain. They are then taken to the dryers and dryed immediately. Rayon, above all other textile material, should never be left in a damp condition any length of time.

Boarding

All hosiery is dryed on frames which stretch the material equally and evenly. This operation is known as boarding. There are two types of hosiery drying equipment. One type consists of a hollow metal form, usually of aluminum, set on a steam pipe heated with exhaust steam or low pressure steam. One operator takes care of a table with many of these forms on it. The hose are stretched over the form and gently pulled down until all wrinkles are gone. He passes to the next form and so on. When the table is filled, the first form has dried its product. The hose are then removed and the operation started over.

Another type of dryer that is much in vogue for drying full-fashioned rayon hosiery consists of a wooden form about ¼ in. thick. The full-fashioned hose is drawn over the board and the board set into a compartment not unlike a drawer. This compartment is part of the dryer, and revolves in the air compartment. There are several of these compartments, which when set in motion form a complete cycle. When the last compartment filled is set into the dryer, the first filled compartment is discharging its contents, dried. The rayon is dryed with a large volume of heat at a moderately low temperature.

Rayon in Woolen and Worsted Fabrics

Successfully Used in Many Knitted and Woven Goods, Including Bathing Suits—Combination Has Good Wearing Qualities—Plated Patterns—Selecting Type of Rayon—Heavy Looms Require Two-Ply Rayon Yarn—Methods of Handling in Mills—Problems of Dyeing

By Royal Little

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WITH rayon rapidly establishing itself as a textile fibre of primary importance, manufacturers of all types of fabric are becoming more and more interested in developing the use of this comparatively new yarn in their materials. Since the war, tremendous strides have been made by the cotton, silk, and knit goods mills in increasing their consumption and diversifying their uses of rayon. The weavers of woolen and worsted fabrics, however, have been the last of the important textile groups to take up rayon seriously except for use as minor decorations.

The result of this delay has been that, in the past, less than 3% of the total poundage of artificial silk made in America was consumed by these manufacturers. The next large development in rayon will doubtlessly be in this field in linings, overdraperies, and women's dress goods, in which from 30% to 50% of the cloth will be composed of rayon. The use of rayon for minor decorations will also become more prevalent, especially in men's wear; and in this case, while the amount of rayon consumed will be small, a tremendous yardage of fabric will be involved, as one pound of yarn will often decorate as much as one to two hundred yards of goods.

Knitted Fabrics

The use of rayon with wool can be subdivided into two classifications: First, in knitted fabrics; and second, in woven materials. In the first grouping come hosiery, underwear, sweaters, bathing suits, knit dress goods, and hand knitting yarns. In all of these things, rayon has been used successfully and in large quantities for the last five to ten years. The manufacturers of these goods were very quick to adopt rayon and employ it lavishly to embellish their fabrics. For these uses it is particularly well adapted on account of its high lustre, and because it can be either dyed in the piece into solid shades or cross-dyed for contrast into two-tone effects.

The wearing qualities of these materials are also very good, as in practically every instance the rayon and worsted yarns are twisted together or run parallel so that the stronger fibre supports the other. In hosiery, the two threads are either twisted together before knitting, run random in the knitting machine, or the rayon is plated over the worsted. It is customary to piece-dye the finished hosiery; and, in the first case, the two fibres are usually cross-dyed into two colors to give a heather effect. This particular style was very popular several years ago, though the demand has since dropped off. The other two effects are usually piece-dyed into solid colors.

In the case of underwear, rayon is used chiefly plated over the worsted base, although sometimes a twist of the two yarns is employed. As practically all of these goods are left in the natural or bleached state without piece-dyeing, the plated effect shows up the artificial silk to much better advantage. In sweaters, a plated or a plated pattern effect is most popular, and some very beautiful garments have been produced in this way. Curiously enough, in spite of lack of strength when wet, rayon has been used extensively plated over yarn-dyed worsted to make bathing suits more attractive. Knitted dress goods are made from twisted yarns and also in plated and plated pattern effects similar to sweaters, and these fabrics can be made either yarn or piece-dyed.

Large quantities of rayon have been used twisted with yarn-dyed worsted for hand knitting yarns, and in most cases the artificial silk is left in the bleached condition to give a silver tone effect. In practically all of the uses described above, rayon of the viscose type is chiefly used because it is inexpensive, uniform in size and dyeing qualities, and has excellent covering-up power. In cases where a finer size is required, the nitrocellulose rayon is used to advantage.

In Woven Fabrics

There is probably no branch of the textile industry where manufacturing practice and technique vary so widely as among the woolen and worsted mills in obtaining finished fabrics, which to the uninitiated appear to be one and the same thing. In the first place, it is possible for the mills to make their goods stock-dyed, yarn-dyed, or piece-dyed; and in any of these cases they may consist of nothing but wool, of wool with cellulose specks, or of wool and cotton. As all virgin wool contains a certain amount of cellulose matter, it is necessary for the manufacturer, if he desires nothing but wool in his goods, to carbonize this material out either in the stock or in the piece, or to pick out the specks by hand after the goods are finished.

If the mill sells materials in which cellulose specks remain, it is necessary to speck-dye the goods in the piece to prevent undyed spots from appearing in the finished fabric. Drawing crayons of the same color as the finished material are sometimes used by the inspectors to shade over these imperfections.

Another type of fabric includes the cotton-worsted and union goods. Many of these are entirely dyed in the piece and must, therefore, be colored with union dyestuffs or combinations of direct and acid colors. Sometimes these goods are only piece-dyed with acid dyes and then speck-dyed to cover the cotton. In any case, the unions compose the cheapest class of woven fabrics in which wool is used, and often the wool is all shoddy.

Selecting Type

On account of all these variations in making woolen and worsted goods, the question of selecting the type of rayon best adapted for the purposes of each mill is a very important one and requires an intimate knowledge of manufacturing conditions and also of the properties of each type of rayon. In the first place, if goods have to be carbonized in the piece, all rayons are out of the question, as none of them will stand the process. Then, in practically all high-grade woolen and worsted men's wear the clothing manufacturers require as a test that the entire fabric dissolve in caustic soda to prove that it is all wool. Rayon will not dissolve in this test, but eventually this test will be so modified as to permit the use of rayon for decorations in high-grade men's wear.

The next difficulty is that rayons of the viscose, nitro-cellulose, or cuprammonium type are not resist to speck, direct or union dyes, so that these yarns cannot be used for decorating goods on which these colors have to be employed. If decorations are required, it is necessary to use in this case, either lustron or celanese. The former yarn can be used satisfactorily in dress goods which have to be crabbed or dyed at high temperatures. These two yarns, being cellulose acetate base instead of cellulose, are natural resists to most all colors used in dyeing wool and union fabrics. It should be borne in mind, however, that while lustron and celanese are both acetates, their chemical and physical properties vary widely.

At the present time, there is a large yardage of wool goods made decorated with rayon. On women's dress goods, it has almost entirely replaced real silk for use in warp stripes and checks on account of its high lustre, even in all-wool fabrics of the highest quality. In men's wear, the use of rayon has been limited to the cheaper materials on account of the boil-off test. There are a few fabrics being developed which promise to use quantities of rayon. One of them is an all-wool ground fabric with rayon cut pile for cloakings; another is a rayon filled worsted or mohair warp lining cloth; and a third is a dress goods material with worsted warp and solid rayon filling. There are innumerable other possibilities along these lines which will be rapidly developed in the next few years. It will not be long before the woolen and worsted weavers become substantial users of rayon, and then another interesting advance in its use will have been started.

Handling Rayon

On account of most woolen mills using heavy looms which are not well adapted for handling fine yarns, it has been necessary for them to use two-ply rayon yarns in the warp, instead of running singles as the silk and cotton mills do. These yarns are received by the mill both white and dyed, on spools or on tubes; and, if a worsted mill, the rayon is run on to a light silk beam direct from a creel and then dressed into the warp on the front of the slasher without passing through it.

If it is a woolen mill, the yarn is jack-spooled if possible and then run in with the warp on the dressing frame. If the yarns will not stand spooling, it may be necessary to run direct from a creel into the dressing frame. The sizes most commonly used for decorations are 100-2 and 150-2, depending upon how prominent a stripe is required. These decorations are always used at least two to a stripe to avoid a stitchy appearance. There are also numerous combination yarns in use by the woolen mills making men's wear. These are twists of cotton and rayon or worsted and rayon, and it is possible to use them for single end decorations by throwing them to the surface of the fabric. Another popular combination yarn which is used as solid warps for dress goods is a hard twist of a fine size of rayon with a single or two-ply worsted. This gives a bright pepper and salt effect when finished.

When it is necessary for a mill to use yarn-dyed rayon either in singles or in ply or combination yarns, it is necessary to consider carefully the various processes through which the goods will pass. It has been found that washing fast direct colors on rayon will stand moderate fulling, and therefore can be used to decorate yarn and stock-dyed goods. If, however, the material has to be crabbed or piece-dyed, it will be necessary for the mill to use the more expensive indanthrene colors on the rayon they use. While the rayon producers do not dye, twist, and package their yarns for the woolen and worsted mills, there are convertors who specialize in this work and sell the manufacturer the finished yarns in exactly the form required.

Dyeing of Rayon in the Skein

Outline of Process for Handling This Fibre—Care Needed in Selection of Dyes—Softening and Lubricating Important—Must Be Kept in Good Winding Condition—Accurate Specifications Should Be Given the Dyer—Specific Types of Fastness Obtainable

By Edwin F. James

Of the Textile Silk Dye Works, Philadelphia

FOUR definite factors are important in connection with the use of rayon in substantial quantity by mills organized and equipped to run silk, cotton, woolen, or linen yarns.

One distinctive feature is that rayon comes to the mill as a completely finished article, requiring no outlay whatever for carding, spinning, or other preparatory equipment. In fact, we, as commission dyers, frequently arrange for our customers all necessary processing in the way of sizing, beaming, spooling, coning, copping and twisting, shipping the yarn all ready for the looms or knitting machines. Many mills are using large quantities of rayon with no additional space, special machinery, or organization of any kind, other than that used for the regular class of goods previously handled.

Another unique circumstance is the stability of price of rayon, differing in that respect from all natural fibres used in the textile industry, and relieving the executive branch of the trade of the uncertainty of cost, speculative in other yarns. Moreover, this feature is likely to be a permanent one. The raw material, consisting of pulp made from cotton linters of wood, indicates a tremendous and steady source of supply, fairly free from uncertainty or disastrous interference. As a result, any price changes are likely to occur only at reasonably long intervals, and are never apt to prove radical. Moreover, with demand more than keeping up with the production, no one is likely to be caught with ruinous stocks or contracts when price changes do take place.

Third in the list of desirable qualities and one impossible to overemphasize is the unusual luster of rayon. Obtained with no investment of large sums of money for special machinery such as is the case in securing only a limited amount of luster on cotton by mercerization, rayon comes from the producer with a sheen remarkable in degree, adding beauty to cotton, wool, silk and linen fabrics, otherwise dull by comparison.

The present day tendencies toward brilliant hues and novel effects in woven dress goods, draperies, knitted articles of apparel, and all other textile fabrics, have added impetus to and been enhanced by the remarkable growth in the production of rayon yarns. Twisted or plaited with other yarns in woven or knitted goods in self tones or contrasting colors, used as filling with warps of a different nature, or as a decorative yarn appearing at intervals in warp and filling, it opens up tremendous possibilities. Mills which have for years produced the finest fancy goods of various kinds find it possible to obtain even more beautiful effects by using rayon, and mills heretofore confining their output to plain weaves have taken fresh courage from their investigations of the possibilities of rayon. It has proved suitable for practically every type of loom and knitting machine.

Fourth in the array of forces behind the rapid and striking increase in the use of this most modern of products—the only chemically produced man-made fibre in textile history—is the fortunate situation that it can be dyed with all types of dyestuffs known to the industry as being applicable to the dyeing of cotton. Had it been necessary to invent and perfect special dyestuffs for rayon, it would have impeded beyond measure the progress which has been made, whereas the dyestuff industry was already producing throughout the world in large quantity the identical types of colors needed. As a result it has been necessary for the dyer of rayon to concentrate only upon selection of dyestuffs, according to the purposes for which the product was to be used, and the level dyeing properties of the dye.

Selection of Dyes

This selection is usually for the determination of the following:

(1) Level dyeing properties at the temperatures most desirable on rayon; this applies to all classes of dyeing, regardless of all other considerations.

(2) Fastness to washing, either characteristic of the dyestuff itself, or its adaptability to after-treatment, for use in goods likely to be laundered from time to time.

(3) Fastness to light, for use on yarn intended for ladies' dress goods, window draperies, and other fabrics which are apt to be exposed ton sunlight.

(4) Fastness to bleaching, for yarn intended for fabrics which are to be bleached in the piece, such as shirtings.

(5) Money value.

Except on highly competitive business, money value is the least important influence governing the choice of the direct type of dyestuff. Our observation and conclusion has been that the dyeing of a delicate yarn like rayon, more than in the case of the more sturdy fibres perhaps, should be based strictly upon getting the level results and fastness required by the type of goods to be made and with the least amount of handling. To do this it is frequently necessary to disregard dyestuff cost entirely in the selection, except in such cases where two or more colors of different costs have equally favorable characteristics.

Literally hundreds of dyestuffs are at the disposal of the rayon dyer today, new offerings being made constantly. The up-to-date dyer must maintain a never-ending series of tests if he is to keep pace with the improvements made by the dyestuff producers and the tendency in merchandising channels toward better value in the fabrics made, and the guarantee for fastness required by the purchaser.

Tests for fastness to washing must be made by braiding the dyed rayon with white, washing in soap solution at not less than 130°F. and noting the results as to coloring the liquor, marking off on the white yarn and the effect from steaming in the drying process. Each lot dyed must pass such a test before going to the customer. Tests for fastness to light should be by actual exposure to sunlight wherever possible, so that there will be no question regarding the effect on the color under practical conditions. Examination for level dyeing properties should include the actual dyeing under practical conditions before use in quantity is advisable.

About 76% of the rayon produced in the world is manufactured by the viscose process. Three of the four largest producers in the United States use this method. The nitro-cellulose method, which was the original process invented by Count De Chardonnet in 1884, is the basis for the Tubize plants in this country and Europe, and comprise about 18% of the world's output. The cupra-ammonium process contributes about 5%, all of which is made in Europe, there being no active commercial production under this classification at present in the United States. The acetate cellulose process gives us about 1% of the total, the Celanese brand being the best known of this class, and its production in the United States is being considerably increased. It is used largely for cross dyeing effects, as it resists the ordinary type of dyestuffs used on rayon.

As all of these classes of rayon with the exception of the acetate cellulose type are dyed in the same manner as to both method and dyestuffs, the descriptions which follow apply to about 99% of all of this fibre produced.

Dyeing Method

Calculated in pounds, more rayon dyed in skein form is dyed in open kettles, rectangular in shape, in a stationary liquor, than in any other way, and largely by commission dyers. Production being paramount in commission dyehouses, the hand kettle method has proved most desirable in this respect, together with the advantage of smaller investment and the efficient utilization of space. Moreover, tremendous quantities in the aggregate are dyed in comparatively small units, whereas such machines as have been advanced for dyeing rayon are somewhat experimental, and are principally for large units. Nevertheless, and in all fairness to those whose energies are devoted to this proposition, considerable progress has been made, and further developments are quite certain to come in the future.

The kettles used are made of wood, copper, or monel metal. We have standardized on monel metal in our own plant, in spite of the higher first cost, because there are unusual advantages in its favor. Chief among these is the fact that monel metal is so readily cleansed that a light shade can immediately follow a dark one with a minimum of time lost between the two dyeings and with no bad effect on the light shade. Highly important also is the fact that the strong alkaline solution present in vat dyeing has no deteriorating effect on the monel metal, nor is the shade being dyed either dulled or changed in any way by any action such as takes place in the presence of copper. Monel metal is strong and durable, requiring almost no outlay for upkeep or repairs.

As a rule the rayon skeins are suspended on bamboo sticks across the kettle. In some cases, glass, monel metal, or some of the specially prepared poles on the market are preferred. It is necessary to have them smooth, and of some material which will not become stained by the dyestuff. Usually two sticks about ¾" in diameter are used as a unit, especially in the case of bamboo. The skeins must be spread out carefully so they will not overlap, as any unevenness in the dyestuff penetration at the start is difficult to eliminate later on.

Practically all dyers give the yarn a thorough preliminary wetting out in a bath of soft water, using such methods, temperature, and ingredients as their experience and the class of yarn and type of dyeing indicate are best.

After the dyestuff is properly reduced, it is added to the liquor, either in its entirety, or split into partial quantities.

Some dyers of rayon start all lots at a low temperature, and between each series of turns of the yarn, raise the heat, adding at the proper time

the quantities of salt and chemicals which are necessary. Other dyers, including some of the prominent figures in the industry in England, enter the lot at a temperature as high as 190°F., then lower the heat to 140° and proceed as their experience warrants. Because so many conditions enter into this question, no standardization of method is possible. While it is necessary to handle rayon at all times with care owing to its lack of tensile strength while in a wet state, extremes of temperature while wet are not injurious to it. No tendering takes place while the conditions are very cold or very hot.

The turning of the yarn may be by pulling it over the sticks by hand, by separating the two sticks in each unit by raising one and reversing the position of the skein, or by "sticking" them by inserting a separate rod and partially turning the skeins on the stick or sticks on which it is suspended. The method used depends to some extent upon the skill of each individual operative, as some are likely to be more proficient in one than the other, but it is largely a matter of opinion as to which obtains the best results.

When the dyeing has been completed, the wet yarn is made up into loose heads, and placed in a whizzer to have the excess moisture extracted. In some dyehouses it is customary to wrap the heads in cloth, to prevent injury to the delicate filaments. After extracting, the skeins are opened up and dried.

The drying may be done in a dry room containing steam coils, with or without circulating air, if the element of time is not important, or in a dryer constructed for the purpose, containing circulating fans. The latter may be either a continuous pole or apron type, or the yarn may be hung on poles arranged on trucks and placed in a chamber where the heat is contained. The best medium for drying rayon is circulating warm air, with a low velocity so that the skeins will not become tangled. High temperatures in drying are both unnecessary and inadvisable.

Final Handling

After the rayon is dried and aired up for such time as type of dyeing necessitates, it is straightened out, inspected, and sorted according to the purpose and conditions of use. It is impossible to stress too strongly the importance of this final inspection and sorting in line with the customer's needs. We have found that in order to give our trade the utmost in service, it is practically necessary to learn how every lot is going to be used, even to the type of knitting machine or loom on which it will be handled, and in the latter case, the number and arrangement of the shuttles, and the fabrics to be made.

One reason why this knowledge is essential is because of a certain number of so-called "light and dark" skeins. While this is small in percentage, and shows up only in certain shades and types of dyeing, it is a condition likely to be found at times in all grades and brands of rayon, and unfortunately it is apt to be accentuated in the faster and more important classes of dyeing. This is simply a condition which goes along with dyeing rayon yarn, and no dyer can entirely control or completely overcome the situation, except by final sorting. Even this is only partially successful, as the eye of the inspector is affected by close application after working for some time on the same color, and he must change with some frequency from one color to another to get the best results.

These light and dark skeins are evenly dyed in themselves, but are simply a different shade from the main portion of the lot. By being fully informed as to the purpose for which the yarn is intended, and constantly alert and very rigid in the final inspection, it is possible to segregate most such skeins and prevent them from getting into first quality goods, if the fabrics are such that any damage might be done. Naturally if the yarn is to be used for a narrow stripe in shirting, or a fancy decoration in a stocking or necktie, or used as filling in a pick and pick weave, the light and dark skeins are apt to be broken up and their importance is slight, so that 100% of each lot can go into the goods. In a 4x1 box loom weave, or a single shuttle solid color drapery, they would show up prominently, and cause trouble. The winders and weavers should of course be on a constant lookout for anything of this nature.

Following the final inspection and sorting, the yarn is twisted into heads of uniform size, and carefully baled and wrapped for shipment. We have found it necessary to construct special baling presses of a different character from those in general use for other yarns, protecting the rayon by the use of heavy cardboard and using soft, smooth cotton twine or tape.

It is necessary to constantly keep in mind that rayon is a delicate product while in skein form, composed as it is of a number of very fine filaments loosely twisted together with only 2½ turns to the inch, and it is easily injured by contact with rough surfaces or edges. All equipment must be smooth, and dye sticks and dryer poles must be continually inspected to eliminate any which might cause the yarn to catch and cause breakage.

Softening and Lubricating

The problem of softening and lubricating is an important feature of rayon dyeing, inasmuch as it is necessary to soften the yarn in the dyebath, or in the last rinse on some classes of dyeing. The dyer must turn out his work soft enough to suit any winding, weaving or knitting conditions, without any further oiling on the part of the user. Even with the highest types of stainless oils used in processing, the shade is apt to be affected, and certain kinds of oils would leave an odor in the goods. The exception might be in the case of vat-dyed rayon used in fabrics to be boiled out and bleached or dyed in the piece. A large proportion of rayon woven or knitted in the natural color is of course oiled by spraying or soaking prior to winding from the skein, although some brands are soft enough so that little or no oiling is necessary.

Of great assistance in reaching a higher state of perfection in rayon skein dyeing has been the tendency among manufacturers of the fibre to bleach all or most of their product. There is no doubt but that the bleached bottom is an advantage, as the preparation for and process of bleaching helps to render the yarn cleaner, purer, and of a more uniform chemical composition. It is a very fortunate situation that the method used is so inexpensive that no extra charge is now made for bleaching, and that the extra handling is of such a nature that it does not disturb the condition of the yarn. The dyer who is called upon to bleach rayon skeins must put it through fully as many operations as if it were dyed, and the cost is almost as much as for the ordinary classes of dyeing.

Use of Different Grades

Theoretically, and speaking strictly from the standpoint of results in skein dyeing, there is no difference between to use considerable proportions of B grade carefully handled in dyeing will probably be quite as satisfactory as A grade improperly manipulated, and as a result many mills find it suitable to use considerable proportions of B grade. A grade is of course preferred because it winds, weaves, and knits best due to fewer breaks and knots. For warps and for high grade knitting operations, only A grade should be used. If the yarn is to be dyed with vat colors, where considerable handling is necessary, it is always best to use A grade yarn. The C grade is usually put into twist and other purposes where it is dyed after converting.

There is no definite or standard loss of weight in rayon skein dyeing some brands invariably losing somewhat, others practically not at all, and still others gaining slightly, nor will each brand act the same way in this respect under apparently uniform conditions. At a matter of fact, it is in the drying that the principal change takes place, and the degree of difference depends upon the time in the dry room or dryer, temperature, moisture in the air, and other conditions present. It is customary for the rayon manufacturer to automatically condition the yarn to contain about 9.9 per cent. moisture, placing it in suitable shape for practically all purposes. In the case of weight lost in the drying operation after dyeing, the longer the yarn is afterwards exposed to the air, the more nearly it approaches its original weight. Almost invariably the dyer is so pressed for deliveries that he must ship the yarn as soon as it has cooled down sufficiently, without regard for its weight. Some commission dyers have found it necessary to install conditioning chambers to quickly restore the original weight after drying, rather than risk the suspicion of not returning the full quantity of yarn. Others weigh the yarn either in the dye bath or in winding, either because of their idea that lower prices must be quoted, or because their trade insists upon price reductions that are not warranted by the costs. This of course adds nothing whatever to the value of the yarn, as rayon winds best when it is dryest, within reason. While it is bought on the basis of weight, it is consumed strictly on a yardage basis, and the latter is the only correct indication of yield. It is well to remember that rayon works best in a dry condition and a dry atmosphere. It does not wind, weave, or knit as well on a damp day, and should never be run at high humidity.

Good Winding Condition

Outside of the questions involving the selection and chemistry of dyestuffs, the most important and absolutely vital matter is to keep the rayon in good winding condition. Whether wet or dry, it is a smooth slippery fibre, and to handle it in dyeing, drying, and finishing requires skill and constant vigilance to prevent the bands from becoming misplaced and tangling the skeins. All rayon manufacturers in the United States use only cotton tie bands and a method of diamond reeling which helps to hold the bands in place. One of the reasons why most rayon produced in Continental Europe has not been so successfully used when skein dyed is because it has rayon tie bands and a different reeling making it more difficult for the dyer to keep the skeins in winding condition even with a minimum of handling in the dye bath.

Those dyers who have been most successful in rayon skein dyeing are almost invariably the ones who have had cotton dyeing training and practical mill experience, or at least are in close touch with the subsequent operations through which the yarn must pass. Only with this experience can they understand fully the condition in which the yarn must be if it is to wind well and suit the purpose for which it is intended. Having such knowledge, they are in a position to train the operatives to handle the skeins properly. The necessity for constant inspection and close supervision of all operations, has no doubt been largely responsible for the fact that the quality of workmanship is better maintained in smaller concerns, even though those with large plants in which other kinds of yarn are dyed may be equally skillful in matching shades. Beyond a certain point in production, it is better to establish a separate and complete unit, duplicating the first one, so that the desired supervisory attention may be given every lot going through. The same applies to handling other yarns in separate departments. This is particularly the case with fast or vat colors, which require a much longer process and more handling, necessitating just that much more care and supervision.

Rayon has a remarkable affinity for

dyestuff, and every operation must be carefully planned and known before starting the lot in order to obtain the proper shade and level results with the fewest number of turns. Additions of dyestuffs later on increase the amount of working and interfere with the winding far more than with any other kind of yarn. With other yarns, color can be boiled on level or stripped off without injury, the main problem being to get it on the fibre. In the case of rayon, this is not practical or entirely possible, and the chief feature is to keep the color from going on too rapidly. In vat dyeing, glue or similar materials must be used to hold off the dyestuff. If for any reason it is apparent that the results on any lot are not likely to be up to standard, it is usually best to dye it black and start a new one, rather than try to fix it up and send out work which might wind badly or cause a high percentage of seconds in the customer's goods. One reason why many mills have not attempted or continued dyeing their own rayon is because they have no fabrics in which they can use direct dyed black, whereas the commission dyer usually can salvage such yarn at a fair value, without too great a loss.

We are sometimes asked whether it is possible to treat dyed rayon so that it will resist in cross dyeing with direct or vat colors, in making up cotton piece goods. We are certain that there has never been found a practical method of doing this in quantity, or at least one which could be used promiscuously. We have successfully made up patterns with vat dyed decorations which were cross dyed in the piece with direct colors, but the shades must be worked out in their entirety beforehand. This makes it either a converters proposition, or suitable only for a mill controlling their styles and shades, and is not one which interests the average gray goods mill.

Skein dyed acetate cellulose yarn used for decorating cotton piece goods or hosiery will stand bleaching in the piece, but even when dyed with special colors available, it will not always stand the temperatures necessary in boiling out the cotton or in cross dyeing it. The greatest use for acetate cellulose yarn in cotton goods lies in the advantage of weaving in the gray, and dyeing two tone effects in the piece by the converter purchasing the material from the gray goods mills.

Need of Specifications

The type of dyeing selected for each lot of rayon yarn must be determined by the class of fabrics in which it will be used, and the character and degree of fastness required. This merely emphasizes the necessity for the customer who will use the yarn to give all essential information to the dyer, and indicates the vagueness of the term "commercially fast colors." If it means anything, it means merely a match of the shade desired, even though the dyestuff selected is so fugitive that it will fade almost at once. Consequently prices quoted on inquiries for "commercial colors" are likely to vary as much as 50 per cent. or even more, and no basis for comparative quality can be determined except by further investigation. Speaking generally, it always pays to select the best colors that the price and quality of the goods will warrant, rather than to choose the cheapest colors which will serve the purpose.

There are vast quantities of skein dyed rayon used in the manufacture of sweaters, knitted neckties, mufflers, scarfs, ribbons, braids, knitted sports clothing, tie silks, elastic webbing, fringes, electric wire covering, and a myriad of novelties both knitted and woven. Practically none of the articles named are likely to be laundered, and those which may be occasionally subjected to washing are likely to be handled with due regard for the fact that the colors are not apt to be very fast. For this reason it is customary to use the ordinary type of direct dyestuff without regard to fastness in dyeing for the purposes named. All efforts are concentrated upon getting the proper shade and having the yarn evenly dyed and in good winding condition. We of course know that many other fabrics are made up with yarn dyed no faster to light or washing than those described, but when it is considered that the fastest colors, other than vats, cost very little more in most cases, we do not recommend this class of dyeing to any cotton mill except under special conditions. It sometimes occurs for example that a purchaser of draperies will insist upon the use of the cheapest colors, and leaves the mill with no alternative except to obtain what is specified. Most colors in this group are domestic dyes.

The next group is what we designate as washable colors. They are usually recommended where fastness to light is of lesser importance, but where the dyed rayon is to be used in goods sold as fast to washing only, with either white or lighter colored yarns as part of the fabric. This group of colors includes not only those domestic and imported dyestuffs which in themselves are extremely fast to washing, direct, developed, and sulphur, but also those which properly after treated are rendered capable of standing the rigid tests which they must pass. It is seldom that this group suits the purposes of cotton mills, although some of it has been used at times in ginghams. It is planned principally for children's ingrain stockings in which considerable white yarn is used, and for decorating fancy tops in sport hose, and in sport clothing. It can be used in some cases for braids and trimmings on washable garments, or in decorating cross dyed worsteds.

The class of colors more widely used than any other in piece goods weaving is what we term the sunfast colors. This is comprised of imported and domestic fast to light colors. Careful selection after the determination of the fastness characteristic of each color chosen has resulted in a class of dyeing of great value. Used straight, as many of our customers find it advantageous to have us do, these colors possess a degree of fastness to light when properly dyed that is practically equal to some of the vat colors, and even in combination as is more largely the case, they show up remarkably well. Not only are they fast to light to an exceptional degree, but they stand up extremely well in all washing tests at remarkable temperatures.

Probably the greatest call for the sunfast group is from the drapery and upholstery fabric weavers, and mills are using yarn dyed with this type of colors for everything from the most flimsy summer godds to the heaviest close pick damask weaves. We usually recommend this class of dyeing for ginghams or any other light weight dress fabrics where the quality will not warrant the cost of vat dyeing. Compared to the value, the cost for this class of dyeing is so little more than for the cheapest colors, that the latter need never be used for goods carrying even the semblance of a claim for quality, The term "sunfast" is sometimes applied to much more fugitive and cheaper colors than should be included in this group. As a range of colors is only as fast as its weakest color, the customer must be willing to take large risks if he insists upon or considers too low a price for dyeing. A so-called "sunfast" range can of course be made up at almost any price.

The highest type of dyeing on rayon is that with vat colors, commonly known as Indianthrene, although that is merely the trade mark of one of the large producers in Europe. While even in this group, selection must be made according to the type of fabrics in which the yarn will be used, as some are faster to light or bleaching or washing than others, it is possible to select a range of colors which are practically indestructible, in the usual commercial treatments involving tests for light fastness, washing, or bleaching in the piece.

The vat colors are used in dyeing rayon which is to be used in the finest qualities of guaranteed draperies, and probably because this is usually for filling, the largest volume of vat dyed rayon skeins goes to this class of trade. Of far more interest to the average cotton mills however, is the fact that this class of work is adapted for use in putting stripes and decoration in shirtings and similar goods which are to be bleached in the piece, and there has been a gradual and substantial increase in the development of patterns of this character. Vat dyed rayon is also used in woolen and worsted goods which are piece dyed, especially those which are scoured and fulled, and this is a field which shows considerable development.

Scouring and Bleaching Rayon

Removing Conditioning Oil—Importance of Soft Water—Chlorine and Peroxide Methods of Bleaching—Holes in Goods

SOME mills simply saturate the skeins of rayon with an oil and then hydro-extract, allowing about 12% of oil in the fibre; others spray the oil on the fibre, with no extraction. This latter method is rather haphazard and has often led to trouble. By far the best method is to allow the single strand of fibre to run over a wick, fed from a vessel containing the oil mixture, as the rewinding is being carried out.

Before dyeing or bleaching, the above mentioned conditioning oil must be removed from the fibre in order to obtain satisfactory results. It must be remembered that rayon that has been conditioned and kept in storage for a long period before scouring will often give trouble when it is treated for removing this conditioning oil, especially when the material is to be sold as a white.

The recipes in use for scouring rayon are numerous. When the fibre is to be dyed a dark color, a boiling of one hour in a soap and soda ash bath is recommended. The same treatment for one and one-half hours will give good results for light, bright shades. The writer has run across several firms who have been simply wetting out their artificial silk hose in hot water for five minutes or so previous to dyeing, and then wondered why their goods had a rancid odor after storage, and also why they became blotchy from the oil coming to the surface and oxidizing after storage.

Scouring for White

When scouring for a white, great care must be taken that practically all the conditioning oil is removed, or the goods will yellow up very badly in storage. Also, the oil has a tendency to combine with the soap to form insoluble curds which become attached to the fibre and form stains that are practically impossible to remove. It must also be kept in mind that rayon is very sensitive to strong alkalies and high temperatures, and the combination of the two spell ruin for the fibre. Therefore, caustics and continued high temperatures should not be considered in treating this material.

There is one item which has cost many firms considerable money in scouring, and that is hard water. It is very difficult to obtain a clean, pure fibre in the presence of hard water, and it is recommended that a water softening plant be installed at once where this condition prevails. It is true that the water used in scouring can be softened by the addition of a small amount of soda ash or silicate of soda, but this will also have to be done with all the rinse waters until the soap is all removed, and then the soda must be removed with the hard

water. There is always a small amount of oil which becomes attached to the machine (in the form of a soap emulsion), and this will be precipitated as soon as the hard water is turned therein. It is readily seen that the time lost in attempting to eliminate these troublesome curds in hard water will soon pay for the installation of a water softening plant.

Another important item in the treatment of artificial silk is to see that the scouring machine is often boiled out with caustic soda to remove any adhering grease. The machine should of course be thoroughly rinsed until all traces of caustic are removed.

Rayon, when scoured for bleaching, should be treated for at least two hours in a bath containing 10% to 20% of a good vegetable oil soap, or a sulphonated castor oil. To the scouring bath should also be added about 2% of silicate of soda; where the water is hard, soda ash is better. In rinsing out the scour liquor, wherever possible warm water should enter at the bottom and be allowed to flow out at the top. The goods should be rinsed until clean and pure, and then hydro-extracted, after which they are ready for the bleach bath.

The bleaching of rayon, that is, the best method, has caused many controversies. There are many advocates for the chlorine method and others for the peroxide method. The hydrogen peroxide method may be excluded, as it is too costly to be considered practical. The sodium peroxide method requires a skilled man in the preparation of the bleach liquor—otherwise it is risky. But this is also true of the chlorine method.

In the case of one large hosiery mill in the South, the chlorine process was thrown out and the peroxide method installed when it was learned that the mesh bags used in bleaching the artificial silk were sometimes mixed with the bags used for the pure thread silk, and that the pure thread silk when bleached in these bags turned decidedly yellow. It was true that the chlorine was indirectly responsible for this yellowing, but direct responsibility lay with the bleacher who allowed both the artificial silk and the bags to go to the finishing room with considerable chlorine still in them. You can well imagine the yellowing that resulted when this material was dried and stored.

When preparing a bleach bath for the above-mentioned fibre, the chlorine should be absorbed in soda ash solution only; that is, no caustic should be used. This, of course, will necessitate a fresh mixture every day, as the soda ash solution of chlorine is not stable enough to hold over 24 hours.

Care is Required

Regardless of which method is used for bleaching, the procedure should be controlled by one who understands his business. The chlorine should not be used too strong and too much faith must not be placed in the Twaddle hydrometer, especially if the liquor is used over again, as the Twaddle registers the density of the liquor and not the available chlorine. The rinsing before scouring should be thorough, for the action of acid on a chlorine liquor is well known and tendering will result if there is any considerable amount of chlorine in the fibre. The necessity of rinsing all the acid from the material, of course, cannot be stressed too strongly.

When bleaching with peroxide, the bath is made slightly alkaline with silicate of soda after the sodium peroxide has been neutralized with sulphuric acid, and the material bleached at 145 deg. F. The addition of an oil prepared expressly for this purpose serves as an assistant to the bleach and also retards the action of the alkali, so that the artificial silk is not harmed. After bleaching with peroxide, the material should be thoroughly rinsed with warm water. Tinting gives a much better appearance.

Holes in Hosiery

A number of manufacturers have complained to the writer that their greatest loss in handling artificial silk hosiery was in the boarding room, where the boarders pulled holes in goods while pulling on the boards. All artificial silk hosiery, whether dyed or bleached, should be partially dried previous to boarding. This will eliminate practically all damages from the boarders, unless the material has been tendered.

Standardized Practical Tests for Rayon

Importance of Fibre Warrants Development of Standard Practice—Tests Made on Silk May Be Adapted to Rayon with Only Slight Modification—Curves Showing Stress—Strain Relation of Rayon as Compared with That of Other Yarns

By W. F. Edwards

RAYON has became a commodity of such large proportions and of such commercial importance as to suggest the advisability of a standardized practice in buying and selling transactions based on tests that determine the quantity and quality of the rayon involved in the transaction.

Buying and selling transactions in raw and thrown silkworm silks have been based on certain practical tests in Europe and the United States for several decades until they have become a matter of course in such transactions. Quantity tests by the nature of the case have received most attention and have been most widely applied and with very slight modification for the last 20 years and may, therefore, be considered as resting on a sound basis and as well tried out.

Quantity Tests

The usual quantity tests applied to raw silk are tests to determine conditioned weight, boil-off, and average size. These tests are applicable to rayon with only slight modifications. The apparatus used is the same and the general method of use is the same.

The constants of rayon are not so securely based as those of silk on account of the rapid changes in the product due to the almost continuous improvement in the manufacturing operations until quite recently. There is now sufficient constancy of product to warrant the use of purchase specifications based on tests and to warrant suggestions on the standardization of the tests.

Conditioned weight is the dry weight plus a standard regain. This regain for raw silk has been 11% the world over since the meeting of the International Congress at Turin in 1875. This 11% is intended to represent the amount of moisture that dry silk would acquire in coming to equilibrium with a standard atmosphere having a temperature of 70°F. and a relative humidity of 65%.

No standard regain has been established for rayon, but 11% has been used quite generally in Europe and the United States. This regain is near enough to the correct regain for standard atmosphere on the regenerated cellulose types (viscose, cuprammonium and nitrate processes) so that its use has given a conditioned weight approximating the weight of the rayon when in equilibrium with the standard atmosphere.

The acetate ester type (Celanese and Lustron), however, in equilibrium with the standard atmosphere contain only about half as much moisture as the regenerated cellulose types, so that 100 lbs. in equilibrium with standard atmosphere contains 94.79 lbs. of Celanese rayon, whereas, 100 lbs. of the regenerated cellulose types contain, under the same conditions, only 90.09 lbs. of rayon; i.e. a given weight of Celanese or Lustron in equilibrium with standard atmosphere contains over 5% more rayon than the regenerated cellulose types under the same conditions.

The standard method of obtaining the conditioned weight of raw silk is to dry a carefully chosen sample of about 400 grams at a temperature of 140°C. by passing a current of air having this temperature through the oven and the raw silk skeins at a rate to dry the silk completely in from 15 to 20 minutes. The final test of dryness is that of weighing at the end of the 15 or 20 minutes' period and then again after each five minutes more exposure to the air current until the difference in weight between two successive weighings does not exceed five decigrams when the drying is considered complete.

The sample taken from the bales or other package should be large enough to divide into three 400-gram (roughly) samples, two of which are dried as checks on each other. If they show a loss not differing more than one-half per cent, the average of these is used in computing the conditioned weight. If the loss varies more than one-half per cent, the third sample is desiccated and if the maximum variation does not exceed one per cent, the average of all three is taken as the basis of the computation for conditioned weight. In case the variation is greater than one per cent, it is assumed that the moisture condition of the package or lot is not uniform and resampling is necessary.

The dry weight of rayon can be obtained in the same ovens with the same flow of air as used for raw silk, but it has been found advisable to use a temperature of 125°C. or lower instead of 140°C. The period of drying will vary according to the moisture content. Very wet rayon may require as much as 40 minutes' drying before the difference between two consecutive weighings, five minutes apart, is less than five decigrams.

The computations for the conditioned weight are the same as for raw silk, except in the case of the acetate rayon where the regain should be about 5.5% instead of 11%. Six per cent is more commonly used, but it is probably too high. See Table 1.

Boil-Off

The boil-off test on raw silk is for the purpose of determining the gum (sericin) content of the silk which may be of value per se, but is more often used in conjunction with the boil-off on the thrown silk made from it in computing the clearance.

The same method of test may be used with rayon, but it is necessary to observe certain precautions on account of the difference in behavior in hot solutions. The boil-off on rayon is for the purpose of finding the amount of oil that has been applied to the rayon.

The boil-off test is usually reported as based on either dry or conditioned weight so that it is necessary to find the dry weight which in the case of raw and thrown silk offers very little difficulty as the soaps and oils used are only very slightly volatilized in the drying operation, but in the case

of rayon offers great difficulty on account of a portion of the oils used being volatile below 125°C. and carried off with the aqueous vapor and counted as a part of the moisture content.

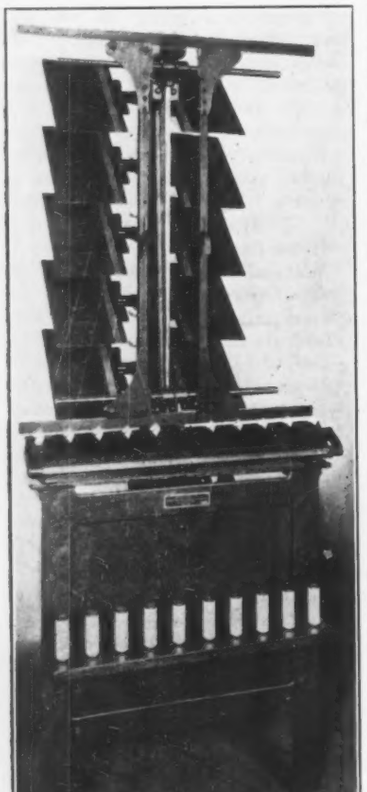

Fig. 1. Machine for Winding Rayon on to Cards for Inspection Test

As an example of the error that may come from volatile oil, suppose that each 100 lbs of rayon is known to contain 10 lbs. of oil, half of which is volatile enough to pass off with the water vapor in the drying operation, 10 lbs. of moisture and 80 lbs. of rayon. A test sample of 100 grams will come to constant weight when it has lost 15 grams, 10 grams of water and five grams of volatile oil, showing a dry weight of 85 grams, 80 grams of rayon and five grams of the non-volatile portion of the oil. The conditioned weight of the sample, computed on the assumption that all the loss of drying was due to driving off moisture, would be $85 + 0.11 \times 85 = 94.35$ grams. The conditioned weight of the boiled off rayon would be $80 + 0.11 \times 80 = 88.8$ grams. The difference between these two conditioned weights is 5.55 grams which shows an oil content of $5.55/1.11 = 5$ grams or 5%. The true conditioned weight of the oiled sample should be $90 + 1.11 \times 90 = 99.9$ grams of which 88.8 grams is rayon and 11.1 grams is oil, computed with a regain of 11% which shows 10 grams or 10% of dry oil.

This example indicates how difficult it will be to develop a standard boil-off for rayon until the use of volatile oil is abandoned or a standardized oil is used everywhere.

An interesting case for computation from boil-off data is that of oil content (supposed non-volatile) of combination silk and rayon yarns. If we represent the average denier size (conditioned weight) of the raw silk by d and its boil-off in per cent of dry weight by b and the number of threads used by n and represent the corresponding elements of the combination yarn by D and B and call the oil content of the combination yarn X; then D — nd = denier size of the rayon (whether one or more threads is immaterial) and $b(nd) \div D$ = % of raw silk boil-off based on dry weight of combination yarn. Therefore, $X = B - b(nd) \div D$ = per cent oil. This computation is based on the assumption that the combination yarn contains equal lengths of raw silk and rayon.

Average Size

The average size is determined for the purpose of estimating the yardage of a given weight of rayon and can be found by the method used for raw silk and is reported in the same unit, the denier. The denier size is the weight in half-decigrams of a standard length of 450 meters. The average size is the average of 30 such lengths, i. e., it is the total weight of 30 such lengths in half-decigrams divided by 30.

The test is made by winding off 30 skeins of 400 turns on a reel 112.5 centimeters in circumference and hanging them in a standard atmosphere until they are in equilibrium with it and then weighing them which therefore is based on conditioned weight. The main difficulty is in the maintenance of a standard atmosphere which requires a room and equipment suited to the purpose.

In case of doubt as to the standard atmosphere the average size may be obtained by getting the conditioned weight in the usual way of the thirty sizing skeins taken together.

Table I is a partial statement taken from an extensive report from the Como Conditioning House issued in May 1925 and will be found useful in forming an idea of the variations in weight of raw silk (Italian) and some types of rayon when the weights are varying under the same atmospheric changes as to temperature and humidity. The numbers are the per cent of moisture based on the weights at the time of weighing. For example, the first number 9.834 under raw silk was obtained by using the weight 605 deniers* at the time of weighing and 545.5 deniers after drying at 140°C. for 20 minutes (absolute dry weight). The computation is $(605 - 545.5) \div 605 = 9.834$; the regain would be $(605 - 545.5) \div 545.5 = 10.9\%$.

* I have used this term, denier, as a weight only because it is so used in the report. The actual weights of the example would be 30.25, 27.275, and 29.75 grams, the numbers used divided by 20. A denier is the weight in half decigrams of a standard length of thread (450 meters) and is a two dimensional unit involving both length and mass.

TABLE I.

Temp. ° C.	Humidity %	Raw silk % moist.	Nitro-Cellulose process A % moist.	Nitro-Cellulose process B % moist.	Acetate process (Celanese) % moist.
(a) 14 5	62	9 834	10 151	10 346	5 134
(b) 14 5	72	10 647	10 729	10 862	5 626
(c) 20 0	60	9 460	9 956	9 457	4 600
(d) 18 0	65	9 834	10 248	9 773	4 921
(e) 19 0	65	7 148	10 334	9 825	4.957
(f) 18 5	72	8 319	11 016	10 605	5 556
(g) 18 5	72	8 626	11 158	10 708	5 591
(h) 20 5	70	8 809	11 (61	10 708	5 486
(i) 19 0	73	8 931	11 347	10 913	5 696
(j) 20 0	75	9 007	11 536	11 117	5 905

An intelligent analysis of the numbers of Table I require that attention be given to the following:

(1) That the amount of silk was small and in small skeins so as to acquire equilibrium with the atmosphere quickly. For example, the raw silk was 30 skeins of 20 denier silk. The nitro-cellulose, A and B, processes were each 110 denier and the acetate process, 75 denier.

(2) That weights for (b) were taken three days later than those for (a), the temperature being the same in both, but the humidity, 10% higher in the case of (b). (b) in all cases has a higher moisture content than (a) as should be expected.

(3) That weights for (d) were taken 11½ hours later than those for (c), the latter being taken at 6:30 in the afternoon and the former at 6:00 o'clock the next morning so that the temperature and humidity changes may be considered as having taken place gradually. (d) consistently has higher moisture content than (c).

(4) That weights for (e) were taken 12½ hours later than those for (d), at the same time of day as those for (c), but on the following day. The noticeable thing here is that with temperature only one degree higher than for (e) the moisture content of the raw silk shows a remarkable falling off, notwithstanding that the humidity is the same. There are slight increases of moisture content for the three reasons which indicates that there is an inconsistency in the case of the raw silk which needs explanation.

(5) That the weights for (f) and (g) are taken at the same temperature and humidity, the former in the middle of the day and the latter in the early morning of the following day, eighteen hours later. The numbers for (g) taken in the morning are consistently higher than those for (f).

(6) That those for (h) were taken 12 hours later than those of (g) in the same day, with a lower humidity and a higher temperature and show a higher moisture content only in the case of the raw silk.

(7) That those for (i) were taken the next morning after those for (g) and (h) and show consistently higher moisture content than (g) and (h).

(8) That those for (j) were taken in the middle of the same day as those for (i) and show consistently higher moisture content than (i).

The three quantity tests described in the preceding paragraphs are a protection against too much water or oil and too little yardage. Good business method requires quite as much protection against too uneven, too weak, and too defective rayon as all these enter into the cost of production. It must be said at the outset that tests for quality, for the greater part, have not attained the definiteness

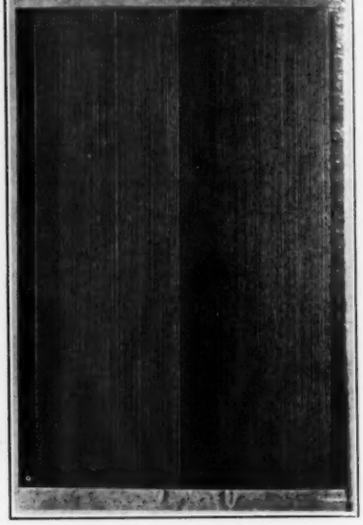

Fig. 2. Cards Prepared as Per Fig. 1 for Inspection Test

of the quantity tests and more accumulated and sorted data must be procured before the desired degree of definiteness can be attained whereby numerical limits can be agreed on.

Inspection Test

The inspection test, as in the case of raw silk, probably holds the place of first importance among quality tests, but is at the same time in the greatest state of indefiniteness of any of them.

This test can be made to advantage by winding the rayon onto cards or boards of suitable color, usually dead black for undyed raw silk or rayon, with regular spacing of the threads on the cards for the purpose of comparison by visual inspection. The machine shown in Fig. I is suitable for the quick preparation of these cards, ten being wound from ten different bobbins at the same time with the same spacing.

The cards will appear something like Fig. II, varying according to the evenness of the rayon thread. Ten cards from ten different well chosen sample skeins will furnish a very good general idea of the evenness and also of other important defects, especially if placed side by side and inspected as a group.

A mailing case has been designed so that the ten cards can be sent from place to place by mail without displacing the silk. The silk on each card is protected by a flap cover: See Fig. III.

This inspection test, in order to

take on the necessary definiteness for grading purposes, must resolve itself into a counting test. What defects to count and an adequate definition of each are prerequisites that have not yet reached the desired state of common understanding that is necessary before a standard specification for making the test by count can be written. It is necessary to have more inspection cards made and compared and reduced as far as possible to some common denominator that shall make it possible to decide what defects should be included in the count and what ones may safely be excluded.

At present the inspection test is a matter of personal opinion based on experience, with only a few persons who have had enough such experience to make their opinion worth while, and at its best amounts to stating that this is better or worse than that. A test is needed that will make it possible to state how much better or worse to some practical degree of definiteness. It is not too soon to begin the accumulation of data to this end. We are going to feel the need of it more and more as time goes on.

A very good idea of the evenness can be obtained by breaking 100 or more threads on a serimeter such as has been long used on raw silk. Ten threads chosen at random from each of 10 or more sizing skeins used in determining the average size will be sufficient to give a fairly good general idea of the evenness. This is capable of giving a numerical relation which is an important consideration.

Serigraph Test

The serigraph test is, perhaps, next to the defects test the most important of the quality tests and has more elements of definiteness at the present time.

This test, as used on raw silk, has been described and examined in sufficient detail in a paper published in the Dec. 23, 1922 issue of TEXTILE WORLD so that it is not necessary to add any further statement here as to the method and accuracy of the test.

The curves given in Fig. IV, V and VI will furnish a very good idea of the stress-strain relation of rayon as compared with that of other yarns.

Fig. IV shows the general stress-strain relation of a number of different yarns. A and B show Tussah silk in the degummed and natural states respectively. The hump in B and its absence in A should be noticed. C and D are curves corresponding to A and B on White Japan silk; notice absence of any hump in either. E is from rayon and shows a decided hump like that of the natural Tussah. This hump is disappearing from recent rayons to a marked degree, showing improvement in the manufacture. F, G, H, and I are on spun silk and cotton yarns which differ from the other yarns in having only slight curving upward and comparatively small stretch compared with strength. This is characteristic of most spun yarns when in

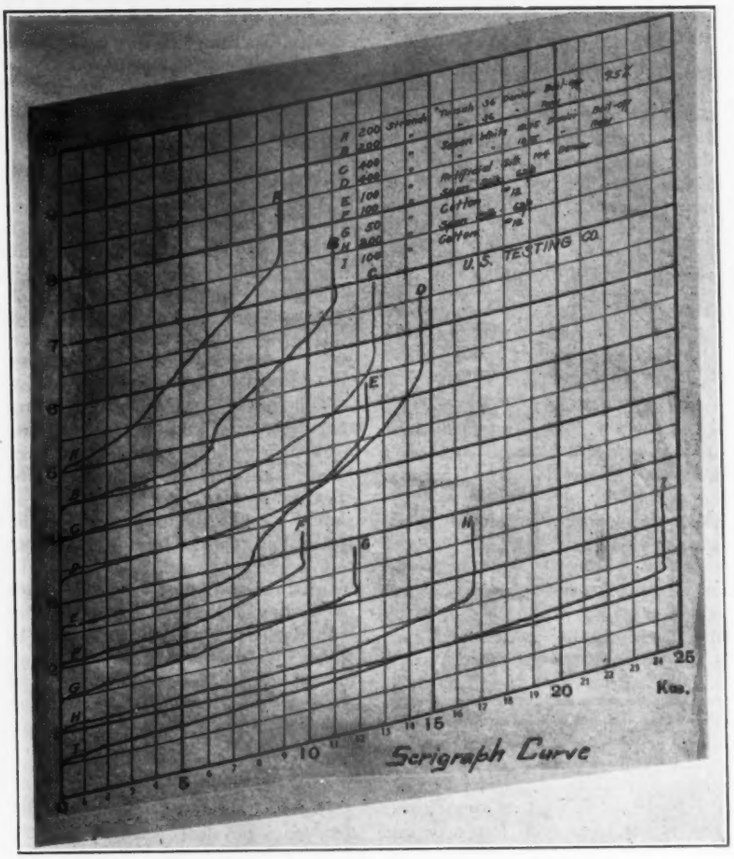

Fig. 4. General Stress-Strain Relation of a Number of Different Yarns, Including Rayon

equilibrium with ordinary atmospheric conditions.

Fig. V shows the curves of wool, cotton, silk and rayon yarns. Those marked dry were in the "as is" state of the atmosphere of the room and those marked wet were dipped in water for less than one minute and the water dried out quickly by absorbent paper and broken immediately. It

Fig. 3. Mailing Case to Contain Ten Cards Developed as Per Figs. 1 and 2

should be noted that wetting takes the hump from rayon and weakens it very much; increases the stretch of and decreases the strength of silk; strengthens cotton yarns without increasing the stretch very much, but acts in the reverse way on wool yarns, decreases the strength somewhat while increasing its stretch very much. More curves of this kind need to be made in connection with other detail data of yarns before we can make a curve that shall be typical of the best yarns, but it is a promising field and should receive active attention.

Fig. VI shows three sets of curves on five varieties of rayon yarns. Those starting from A were made as quickly as possible after bringing the yarns to a "bone dry" condition in a conditioning oven; those from B were made after the yarns were in equilibrium with a very approximately standard atmosphere and those from C, as quickly as possible after dipping, for a few seconds, in water at room temperature; the only drying being due to the operation of placing the yarns in the jaws of the serigraph. The same number of ends is used for the same number in A, B, and C, so that the curves for any one number as No. 1 are comparable.

It should be noticed that in the "bone-dry" state with the exception of No. 4 very little stretch was produced until after a considerable portion of the breaking stress had been applied whereas in the ordinary condition B, No. 4 was little changed from its form in A and No. 3 showed a change so as to have a curve very like that of No. 4, the other three all showing more stretch and less strength in B than in A. Those from C show much more stretch and much less strength than those from A or B and Nos. 3 and 4 are much alike as in B but No. 3 has become the weaker in C.

Caution: Curves made under the same conditions and from the same types as those in Fig. VI do not always show the same shapes that are shown here, the variants at times being quite considerable, showing that the physical structure is not always uniform in the same type. This figure has been presented rather to stimulate more of these tests than to give any definite characteristics of any type and for that reason I have omitted stating the types. The marked difference between the shape of the curves in the wet and dry states will suggest the care that must be exercised to have the humidity condition alike when curves are for the purpose of comparison.

Breaking Strength and Stretch

The breaking strength and stretch, however, of rayon and also of raw silk, the two elements of the serigraph test that are most used, are more or less independent of the shape of the curves and are obtained from the chart by taking the vertical and horizontal movement of the pen from the beginning point to the breaking point; the horizontal distance being strength and the vertical distance stretch. These two elements have now reached a state of definiteness to warrant a little more detail. The denier size of and the number of threads broken are needed in addition to the breaking strength in order to make comparisons.

The computation is:

$$\frac{\text{Strength in grams}}{\text{Number of threads} \times \text{denier size}} = \text{Strength in grams per denier}$$

Example: Number of threads 100, denier size 150, reading on chart or dial at rupture 25 kilograms; then

$$\frac{25000}{100 \times 150} = \frac{25000}{15000} = 1.66 \text{ grams per denier}$$

which would indicate a very excellent regenerated cellulose rayon from wood pulp or a rather poor regenerated cellulose rayon from cotton linters.

The stretch is read directly from the chart and does not depend on number of threads or denier size.

The following table (II) is an indication of a lower limit for strength and stretch for the best grades of raw silk and types of rayon. Some care should be exercised in the use of this table that the tests are made on the materials when in equilibrium with a standard atmosphere. It has already been pointed out that a humidity difference may mean a considerable difference in strength and stretch.

TABLE II

Best Grades of:	Strength grams per denier	Stretch per cent elongation
Raw silk	3.50 up	20 ud
Regenerated cellulose types rayon from cotton linters	1.70 up	20 up
Regenerated cellulose types rayon from wood pulp	1.50 up	20 up
Acetate rayons	1.30 up	30 up

The details of a few tests on

rayons from different sources made at different times by different operators but on the same machine in the same laboratory, will indicate some of the variations to be expected on the same types from different sources, or from the same source for that matter. This table should not be taken as an indication of the differences in rayon of the same type from different countries. These same differences might be shown by two different lots from the same factory.

TABLE III

Regenerated cellulose rayon from wood pulp	Number of threads	Denier* size	Strength grams per denier	Stretch per cent elongation
American I, American II } Same grade, A, from same factory No. 1...	100	150	1.56	27.5
	200	150	1.54	28.5
American III. Factory No. 2, best grade A	200	150	1.60	24.5
American IV. Factory No. 3, best grade A	200	150	1.56	23.0
European, grade not known	200	150	1.48	20.0
European, grade C	100	120	1.42	23.0
Regenerated cellulose rayon from cotton linters				
European, grade not known	200	80	1.63	21.5
European, grade not known	100	300	1.56	20.0
American, factory No. 1, best grade	200	150	1.78	20.0
American, factory No. 2, best grade	200	150	1.85	22.0
Acetate rayon				
European	200	150	1.30	29.0
European	50	300	1.20	36.0

* The denier size is that given by the manufacturer and may vary five per cent or even more from the true average size.

Twist Test

The twist test is made in the usual way and requires no further comment than to suggest that limits should be set as to extreme variations and tolerance for average twist.

Dye Test

The dye test is worth while and is made to determine whether the rayon takes the dye evenly. It now and then happens that a lot of rayon will show small portions from one-eighth inch to one or two inches or even longer portions that have not taken the dye very well. This test should be made under identical conditions whenever two different lots of rayon are to be used in the same goods. The rayon from both lots may take the dye evenly but at different rates. After dyeing, the yarns may be wound on cards as in the inspection test for careful examination. With dyed rayon the color of the card should usually not be black but some other color on which the dyed material will show its defects to advantage, white cards do very well for most cases.

Filament Count

The filament count test is becoming more and more called for. The test requires no description except to state that the count should be made at a number of places in each sample skein if it is to be at all determinative of uniformity.

Identification of Process

This test for the identification of the process of manufacture is best made by the microscope in experienced hands but may be supplemented by chemical tests in cases of doubt. It should not be inferred that the chemical test is superior to the microscope test. The chemical tests, like the microscope test, should only be made by skilled operators of experience with the tests and even then must be made with the utmost care. Neither the microscope test nor the chemical tests can be made by a novice from printed descriptions, no matter how complete.

Winding Test

The winding test is not a quantity test nor a physical quality test but a skein formation test. However, it should be understood that it is of first importance since a badly skeined rayon may be comparatively useless no matter how excellent its physical qualities. This test needs no description. The only requirement is to determine limits which must await more data.

Summary of Suggestions

1. Rayon has now a commercial importance that warrants a standard practice in mercantile transactions based on standardized quantity and quality tests.

2. The tests required are for the greater part the same as those now in use for such transactions for raw and thrown silk and can be made with the same apparatus that is used for silk with only slight modification in the method of using the apparatus but with more care as to the condition of and handling of the rayon.

3. The constants of rayon need to be more securely based on more accumulated and carefully examined data.

4. The accumulation of and study of such data is being carried on in Europe indicating that the need of such study is recognized there.

The writer will be very glad to receive data on the above mentioned tests from any reliable source and will promise to have the data tabulated and carefully examined as a basis of further work to establish standardized tests and securely based constants for rayon.

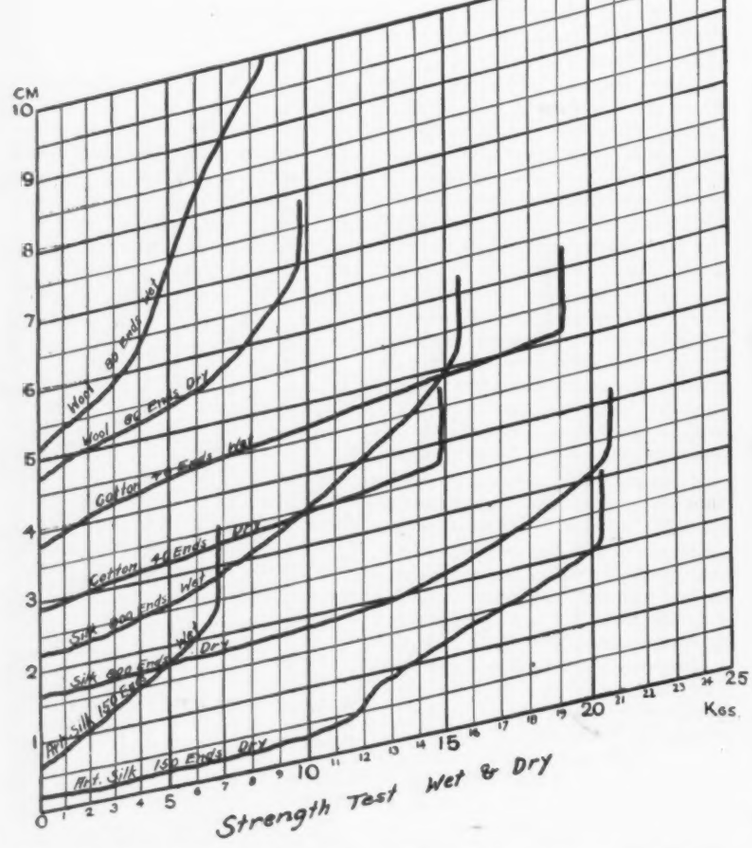

Fig. 5. Curves of Wool, Cotton, Silk and Rayon Yarns (see Text)

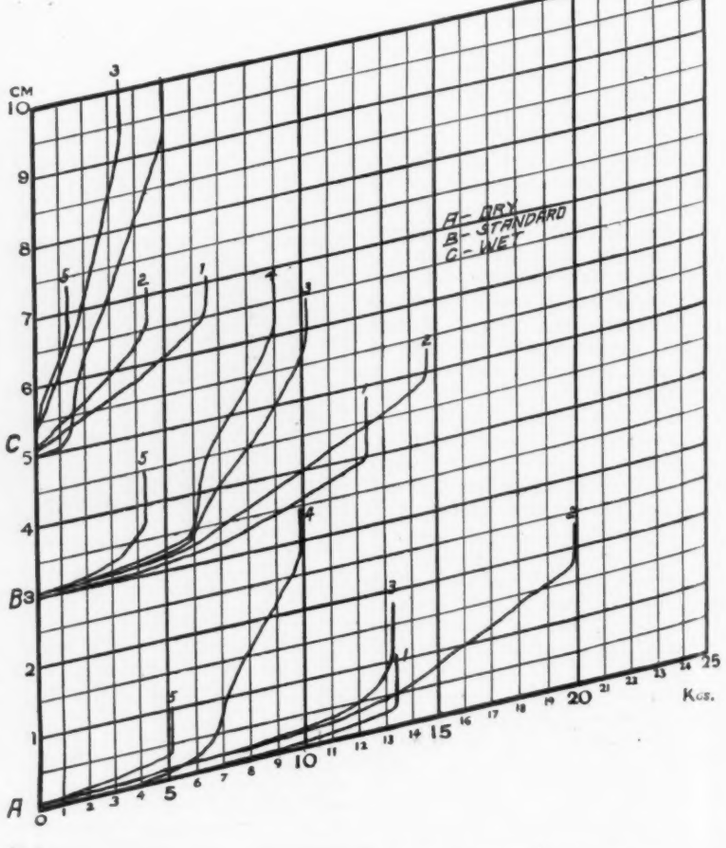

Fig. 6. Three Sets of Curves on Five Varieties of Rayon (see Text)

New Technique Demanded by Rayon

Homogeneity of Structure is Seat of Most Important Difference Between Rayon and Other Fibres—Development of Machinery Will Determine Ultimate Success of Fibre—Rayon Manufacturers Should Not Be Obliged to Adapt Their Fibre to Unsuitable Equipment—Reward of Care in Handling

By Hibbard S. Busby

MUCH of the uncertainty apparent in the handling of fabric made in whole or in part of rayon is clearly due to lack of analysis of the characteristic structural nature of this fibre (or fibres) and its difference from the "old-time fibres." Since the nature of the structure of rayon is little understood, it is, of course, very hard to proceed with effectiveness in handling the fibre to get any desired effect. All too little realization of the extent to which these structural differences affect appearance, quality and finish of goods containing rayon shows in the processing given these fabrics, as well as the queries made concerning these treatments.

Essential Differences

The principal animal and vegetable fibres in common use are built up of a staple fibre wherein length furnishes, through frictional contact, the means to a structural basis of thread formation. In other words, the homogeneity of the thread depends upon multiplication of a greater or lesser number of fine fibres, not upon the cohesive homogeneity of a single thread that is one unit mass throughout. It will be apparent, once this consideration is taken into account, that the very difference between a single thread in a wanted size and the same size made up of a number of fibres brings into the problem a number of other considerations, such as tendency to disruption of the thread in some of its elements, differences in light absorption (and consequent sheen), thickness of the cloth for a given weave, tension of the cloth, general structures, etc.

Throughout every detail of cloth processing, from the original design layout to obtaining the finish wanted, each element of the processing is dependent upon such elements as these. It is particularly dependent upon the degree to which these elements lend themselves to the compositivity (if we may use the word) of the cloth as a whole, which determines the importance of these elements. Too little attention is paid and too much is taken for granted in the fact that we have cotton, silk, mohair, wool, etc., in a varying range of counts which we may work into a weave plan. We strike the full effect of the other side of the problem when we have one of these fibres and a rayon fibre in the same cloth, each of the same size, but each producing a vastly different reaction on all the characteristics of set, finish, bulk, etc., to that which we are normally accustomed.

Difference in Homogeneity

Aside from the fact that the chemical nature and dye affinity of rayon is a special problem in itself, the chief difference, to cloth composition and handling, between rayon and the other commercial fibres is that of its homogeneity described. Grant that rayon has peculiarities such as reaction to moisture, inability to withstand strain when bent in short radius, and difficulty in winding—yet none of these present as great a problem to the manufacturer of cloth as does the fact that rayon is a smooth, somewhat shiny, but certainly uniform fibre. In fact, these other qualities are matters which can be handled with proper machinery. The *nature* of the fibre rayon is susceptible of successful treatment only by skill in handling, a skill based upon the peculiarities of the fibre.

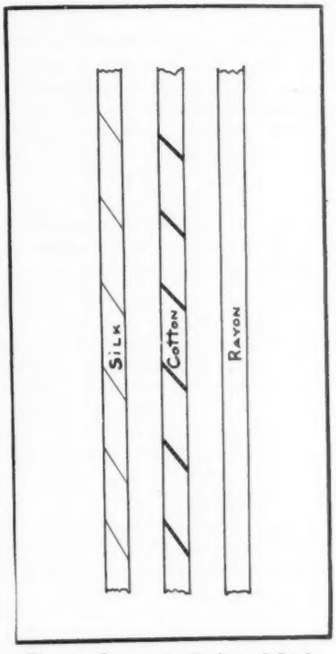

Fig. 1. Losses in Reflected Light

Most rayon can be wound with a high degree of freedom from breaks only when the complete course of the thread, in the operation, is free from tension throughout. Again, the count of rayon yarn required for a given area effect in a pattern is entirely different from the count required for analogous effects with other fibres. This is partly a matter of sheen and partly of smoothness and stiffness. It is altogether a matter of its form, its homogeneity.

In surface-appearance qualities, an altogether different quantity and disposition of rayon yarn per pattern is required than of any other fibre. It is not possible to get from any built-up yarn the same degree or type of light-absorbing effect by anywhere near the same size of yarn which produces such an effect in rayon. Practical instances of these things, and many others encountered, will fix this point clearly in mind as the handling of rayon brings them to daily experience.

The Handling Problem

It is no new story to the people who have ventured into the manufacture of rayon and mixed fabrics to discover that a certain leeway must be allowed for the peculiarities of the rayon fibre. It may be somewhat new, however, to appreciate that the design of high-grade cloths is dependent upon recognition of these effects which will affect later ability to finish the goods properly.

Finishing defects in this class of fabric come almost entirely from conditions which shriek that the rayon was never supposed to be used in the way it has been. This means that the designing was at fault. Either the designer was unable to recognize the adaptation conditions necessary for rayon, or he was asked to do the impossible with it. Now this is not a criticism of rayon as a fibre suitable to a wide range of adaptation. It is very doubtful if any fibre is more so, as we shall point out later; but the particular phases and conditions of its adaptability must be applied properly if success is to be achieved.

In general, the precaution of observing regular good mill practices should be kept prominently in mind in handling of rayon materials. While elementary things are supposed to be self-evident, it is plain, from examination of a great many yards of defective goods that the re-emphasizing of the elementary points is not out of place. A goodly proportion of the defects noted come from such neglect—the rest from failure to differentiate, in nature, between rayon structure and other (built up) textile structure. For rayon is a creature of special demands, and, like all such, demands the regular things also.

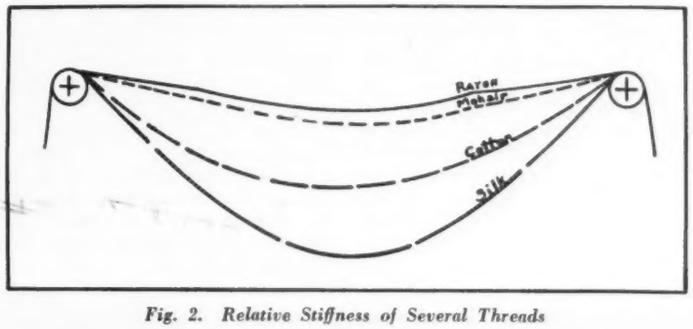

Fig. 2. Relative Stiffness of Several Threads

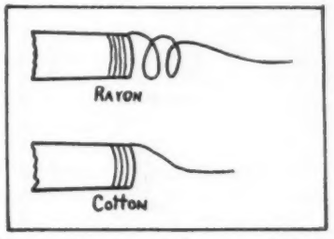

Fig. 3. Looping of Cotton and Rayon Threads

Uniform grading of the fibre is the chief element which will enable the cloth manufacturer to keep out of trouble. In this grading, defective stock will be eliminated and the graded (grouped) lots resulting will promote much smoother and more uniform cloth.

In all the elements of handling both yarn and cloth, effort should be directed toward control of the holding, the movement, and the processing of the fibre and the cloth containing it without strain and in a positive manner. Indeed, uniformity is of far more importance than gentleness, important as is this element in all textile fabric production of high grade.

The moisture element in processing rayon is chiefly important in the sense of its control. Successful dyeing and other treatment of many rayon fabrics depends upon a prior wetting out. It is important, then, to have the moisture state of the processes so well in hand that the transformation from dry-process state to wet-process shall not be so abrupt as to damage the fibre and weaken it unnecessarily. Certain advantages to handling come from various states of moisture content of the fibre, these varying with the type of rayon handled. It is of importance, also, to obtain as nearly as possible a *balance of state* (though this does not mean an equality of moisture) between the rayon fibre in a given fabric and the other fibre present in it. To this end many methods may be applied which will control or modify one or the other fibre. The end of all these is the same, uniformity in condition for handling in the same process.

It would seem almost as though

elements of good mill practice would require only to be mentioned in a general way; but experience points out that such matters as careful winding, even warp tension, even lay in weaving, uniform shuttle feed, uniform tension in finishing, and care in wet-handling of all kinds deserve special precautions.

Result of Care

Rayon lends itself to a wider range of uses than any other textile fibre—if properly handled. Because of the variety of types now available and the remarkable results of researches made upon it, there is possible a range of coloring and finish effects that is almost limitless. It is certainly a tax upon the ingenuity of the designer to make effective use of them all as they become available.

When properly analyzed, there is an extensive range of inter-fibre combinations open to it. These are not altogether propositions of color effect and cross-dyeing. Very beautiful and effective texture effects and contrasts of the line element of design can be produced by proper selection and combination of the fibre composite alone, outside of any color enhancement. Here, again, the problem is one of suitable alignment of the form and size of yarn.

Wherever the need is for sharp contrast of color, texture or finish, and the surface tax upon the cloth is not such as to preclude the partial use of this fibre, rayon offers the widest range of possibilities. Furthermore, where a myriad of color or texture effects is desirable, rayon offers several times the number of possibilities that are offered by any other means.

Machine Requirements

The designer of textile machinery has a new and special field for his efforts in the production of machinery for processing rayon. It is, moreover, a field ample for the inclusion of considerable special design in new equipment and in readaptation of older types. Some very practical recognition of these facts appears in the special machines now in the market for handling rayon in various processes. A great deal more has yet to be done before the full possibilities of rayon in textiles may be realized.

There is a very particular and striking need for both a technique and equipment of adjustment or compensation of the values of rayon. We might almost call this a technique of conditioning rayon. Thus far, application of the methods employed on the other textile fibres gives results which are stupid. It is not a matter of strength, breaking point, and diameter altogether. That is why the older technique is lacking. Shape of cross-section, torsional set, translucence, evenness in structure, and many similar things enter into the problem—also absorptive power, although this has always been an unsettled and poorly determined textile fibre quantity.

Yarn handling machinery, particularly for winding, must be designed to do its best with a fibre which has the inherent tendency of developing an elastic loop very similar to one of the coils of a spiral spring. Alignment more than tension is the hopeful method of attacking this problem.

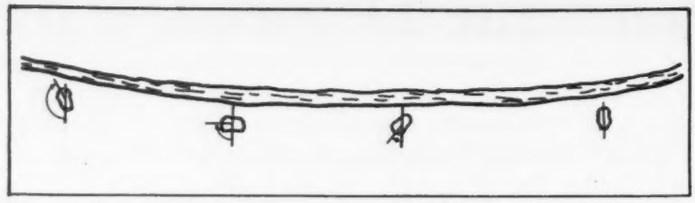

Fig. 4. Twisting of Rayon Thread in a Short Winding Span

The same looping tendency is a factor which must be allowed for in the delivery of yarn from the bobbin in the loom shuttle. Either a high average of breaks or a general lowering of surface quality of rayon yarn is the by-product of usual methods of delivery to the pick.

In all considerations of machinery for the processing of rayon, certain fundamentals, in addition to the homogeneity, should be kept in mind constantly. Rayon is not only a chemical product, it is also, and very definitely so, a machine product as well. Its form, finish, structure and final state are governed, to a considerable degree, by the machinery through which it is evolved. Complete, ultimate success with the processing of rayon will depend upon adaptation of the later processing machinery of the fibre to the intents and purposes of the machine-process elements which put forth the fibre as a uniform, homogeneous structure. And that means, if the lesson of machinery design shows us anything, that we shall be obliged eventually to recheck our fibre-producing element in terms of the findings of our machinery needs in the subsequent processes. All processing is in a cycle, each part dependent upon each other part. For that reason we must not expect to find the final solution of the problem of processing machinery principles until we have tested each principle and each element of our various stages of design in terms of and in alignment with all the others.

In order to bring such an achievement to successful realization, every element of properties, adaptabilities and special qualities in relation to other fibres must enter into the design of the machinery. When this is done we shall realize the possibility of most efficient processing, with the accompanying benefits of shortened and combined processes, better and newer creations, and most efficient unit production. Rayon is the most ideal fibre-creation so far evolved in its adaptability to possibilities of epochal advancement in machine and operation-control technique. The ultimate success of rayon, therefore, depends upon the machinery that will be produced for its delivery to the mill door. Let the machinery man study the fibre, not force the fibre man to depend upon unadapted machinery; and the result will be the most effectively processed textile, one in keeping with modern progress.

Causes of Shiners

Defects Due to Chain of Circumstances Resulting From Unsuitable Machinery—Usually Caused Prior to Weaving

DURING the last few months, the Questions and Answers Department of TEXTILE WORLD has received many samples of rayon-filled cotton goods with the request that the cause of numerous shiners be explained. A statement as to whether or not the defects were caused in the weaving has been particularly solicited. The reply has usually been that the defects were in the rayon and were caused in some operation previous to weaving. We recently sent one of these samples to Hibbard S. Busby, who has made some study on the matter of light reflection by fibres, and the following is his explanation of the fault:

Unsuitable Machinery

Defects in the finished surface of rayon goods of this type, as well as certain other mixtures, like real silk and cotton, silk and rayon, etc., are the result of a chain of circumstances which are an outgrowth of attempting to produce these fabrics upon machinery designed for the straight-run fabrics of some years back instead of machinery that is designed (or adapted) especially for these types of fabrics.

By the same token, these defects cannot be eliminated until the machinery itself is taken in hand and put in form suitable to the physical, structural and peculiar behavior characteristic of these new fibres and combinations of them with other textile fibres. An entirely new set of principles governs the control of these conditions, and since it is impossible, in this limited space, to teach these principles, the proper application of which would avoid such conditions in the finished goods, certain brief methods for overcoming the appearance itself are of most value. All the elements described below contribute to give the shiny bars noted.

(1) There is evidence of unequal tension in the individual threads of the cotton warp — a condition untenable in ordinary good mill practice. Volumes have been written on the correction of this evil, so that its remedy need not be discussed here.

(2) The filling, due to evident mishandling prior to weaving, has been spread or bruised, presenting as a result unequal areas of surface pe pick. When the width of thread in given pick is varied from any caus (such as bruising or other means) more rays of light fall upon the wide pick than upon the regular uniform narrow ones. These, in turn, ar reflected to the eye of the observe and make a higher degree of shinines or sheen, there. Skilled weavin supervision could improve this difficulty by adjustment of the loom, although it is no criticism of the weaving department that this fault, obviously not caused there, is not corrected in the weaving operation. It is a very delicate piece of corrective work, at best.

Remedies Suggested

(3) Partly through improper grading the filler before processing, partly due to the damage in handling prior to weaving, the filler is in a state of unevenness of diameter that could be very profitably corrected. (See TEXTILE WORLD, July 18, 1925, page 57.) This would go a long way to eliminate the trouble and would be an almost necessary precaution if the finish of the goods in this mill is to be a factor in marketing in anything except the lowest-priced markets.

(4) Rayon is a fibre of very irregular cross-section. It is manifestly impossible, therefore, to so handle it in the ordinary loom that it shall present a constant "face" condition to the cloth surface at all times, particularly as whatever bizarre means may be devised to accomplish such a thing are not likely to hold during later finishing processes to which the cloth is subjected. However, if the quills or cops in the shuttle are provided with devices that allow the thread to be fed from them to each pick thrown in a fairly uniform line instead of with loose, intermediate loops, the condition which breeds one form of these shiny bars will be eliminated.

(5) Sometimes bars will persist in spite of all the foregoing. In such a case a thorough overhauling of the machine conditions to which every process of the cloth has to be subjected will reveal the trouble and suggest the remedy. Obviously, all the bad local conditions of a mill's machinery cannot be guessed at entirely, even from viewing an extremely defective cloth.

(6) Very slight and indefinite conditions of shiny-barring can be reduced beyond recognition if the goods are loop-dried and ironed against a yielding surface. The nature of this surface varies with the type of goods. It is a thing best specified by someone who has used this method.

In general, this sample reveals an almost incredible condition of productive machinery—one that is entirely unsuited to the production of such fabrics, although it may have "gotten by" for a long time on the production of cotton-silk pongee of lower quality.

Questions and Answers on Rayon

The use of rayon has brought many new manufacturing problems. The unique qualities of this artificial fibre call for somewhat different treatment than is given by methods and machinery that have been developed especially for cotton, wool and silk. Modifications of old processes and in some cases entirely new methods are necessary. As a result there is a constant demand from mill men for information on the handling of this material in different lines of goods. This information the editors of TEXTILE WORLD undertake to supply, free of charge, to regular subscribers. These questions and answers indicate the character of technical service that is given to readers.

Filling Bars in Rayon Filled Cotton Dress Goods

Technical Editor:

I am inclosing a piece of rayon filled dress goods showing filling bars, or recurring tight places. This defect will show up worse after the cloth is wet out in finishing. I would certainly appreciate any suggestions that you might have to offer as to the cause of this trouble. (5477)

There are more streaks shown in the salmon sample than there are in the blue one, although the two imperfections are different. We should say that the imperfections in the salmon colored piece are due to the poor quality of the rayon; whereas in the blue piece the yarn has been strained in some way, either in the process of throwing or in the weaving, as a slug, bunch or knot on the taper of the cop or bobbin will cause just such places as is shown in this blue sample. All knots and bunches, where possible, should be put on the shoulder of the cop or bobbin and not brought down on the taper, as all yarn that catches in running off the bobbin will make such places as are shown here. They are not tight, but are stretched out and cannot be taken out. This can also be done in the throwing if the guides are not perfectly true or if the swifts should run unevenly. All rayon silk should be run on a balanced swift and the material should be oiled; as this prevents, to a great extent just what has happened on this cloth.

* * *

Use of Rayon With Worsted

Technical Editor:

We have noted numerous reports that have been printed lately to the effect that large numbers of cotton mills are taking up the use of rayon. We presume this is because cotton and rayon combine well in a fabric. We have not heard so much about the use of rayon in fancy worsteds. Can you advise me whether the rayon yarn makes a good combination with worsted yarn? (5417)

Rayon is being used to a considerable extent with worsted yarns, and in the opinion of some people combines better with worsted than with any other textile fibre. One authority who holds this opinion gives his reasons as follows:

1. Worsted is soft to handle and springy in feel. Rayon is comparatively hard.

2. Worsted, being a yarn spun from staple, is hairy and, as far as luster is concerned, comparatively dull. Rayon, on the contrary, is both free from projecting fibre and is highly lustrous.

3. Worsted will felt and lock together when combined in a woven structure. Rayon will not do this, its separate filaments being smooth and continuous in length.

4. Worsted being an animal fibre has affinity for a different range of dyestuffs from artificial silk, the latter being vegetable in origin.

In other words, one fibre supplies just those qualities which the other one lacks, thus making an almost ideal combination for structures which are fancy in character and not too heavy in texture.

In explaining the smaller use of rayon by worsted mills as compared with cotton mills, one authority has pointed out that worsted looms are generally heavier than cotton looms and the preparatory machinery in some worsted mills is unsuitable for dealing with a yarn such as rayon. The same authority states that it is in dress goods that one must look for the greatest development of rayon in conjunction with worsted.

* * *

Splicing Rayon

Technical Editor:

I would like to know the method used in splicing rayon in winding from the skein to the bobbin. (5384)

This question was submitted to the rayon manufacturers and five replies were received, as follows:

(1) Some knitters in winding rayon from the skein to the bottle bobbin twist the broken ends in, after the same method that is used in twisting-in a raw silk warp. To assist them in getting the rayon to stick, some mills use a starch size solution, and some of them simply moisten the fingers slightly. After the splice has been made the spliced portion is put on the built-up portion of the bottle bobbin so that the rayon, in coming off the the bobbin in knitting, will not pull over same. However, we are of the opinion that better results will be obtained if a weaver's knot is tied and the ends cut closely. By using this method there is not as much danger of the two ends of the rayon separating, and it does not show as large a flaw in the finished goods as a splicing does. I have never seen a machine of any kind used by any hosiery manufacturer in doing this splicing operation. It is done with the fingers by twisting the yarn together just as it is done in twisting in a warp.

(2) I am enclosing a few strands of artificial silk with splices in them. From examining these splices I believe you can see the way it is done. Some of the knitting mills make a splice of this sort by hand, rather than tying a knot which is apt to snap off at the needles. When these splices are done correctly they will not pull out.

(3) We know of no method in general use for the splicing of artificial silk in winding from the skein to the bobbin. Attempts have been made to splice by the use of a gummy glue-like substance rolled between the fingers, but this method is in no sense of the word satisfactory and common practice is for the simple use of either the weaver's or the winder's knot.

(4) We beg to advise that we know of no machine used for this purpose; all splicing of this material is done by hand.

(5) We always advocate the tying of knots by hand. The knots should be weaver's or flat knots. On no account should bunch knots be tied as they will not pass through the needles or heddles without causing a break-out.

* * *

Defects in Rayon and Silk Hosiery

Technical Editor:

We are enclosing four finished and four unfinished stockings which one of our customers recently sent us. These stockings are made of 1 end 150 denier rayon plaited on three ends 13/15 Japan. Our customer advises that one lot of 250 doz. sent to dyer were completely spoiled and in a second lot sent to another dyer over 50% were ruined due to the same defect. This defect occurs only in their bleached lots, all other colors, including all the light shades, are satisfactory. Our customer runs another grade, rayon plaited over mercerized, and neither dyer has experienced any difficulty bleaching it. Could you advise us the cause of this trouble? (5428)

We are inclined to think that your difficulty is a knitting machine trouble. We would advise examining your machines carefully for rough latches on the needles and other parts that the fibre comes in contact with. Look for rusty needles also. Failing to find your answer here, examine your rayon carefully for thin or weak spots in the cone. Also make certain that the fibre thread is well lubricated so that it runs through machines (knitting and winding) without sticking.

Of the four stockings (unbleached), one was in bad shape due to faulty knitting and the other three contained small brownish stains which appeared to be iron stains. If the stains were iron rust, this would account for the holes, but upon bleaching these hose by the peroxide method, the results were perfect, with no holes or tendered spots, so that the stains could not be iron.

It will be a good idea to examine all your equipment for a possible source of iron rust. If you are conditioning the rayon yourself, assure yourself that the oil contains no acid which would eat iron or steel and thus bring iron onto the fibre.

We presume your dyers are using the peroxide bleach for this stocking. They no doubt are aware of the effect of chlorine on Japan silk. Should they not be aware of this and use chlorine, this chemical will of course tender the pure silk.

The fact that you are having no trouble with the colored hose does not prove of course that it could not be due to faulty rayon yarn or to rough needle latches, for the process of bleaching always weakens artificial silk to a small degree, whereas dyeing does not, at least not in comparison to bleaching.

If there be a weak spot in the thread, the bleaching renders it still weaker. The bleached stockings pull harder on the boards, all of which may be just enough to break the thread in these weak spots.

* * *

Two-Tone Effect on Rayon and Cotton Fabric

Technical Editor:

Enclosed please find sample of what is known as a two-tone effect in rayon and cotton fabric. In other words, the silk is darker than the cotton cloth. Will you be good enough to tell us, through your Question and Answer page how this effect is obtained? (5470)

We suggest that you try the following method, which works well on a practical scale: The dye bath contains 15% of glaubers salt, 2% of Marseilles soap, and ½% of soda, the fabric being entered at 30 to 40 deg. C. After treating for some time (one-half hour) at this temperature, add 10% more of glaubers salt and raise the temperature slowly to 85 to 95 deg. C. With this additional amount of glaubers salt and higher temperatures, the rayon will take up more dye than the cotton. It is advisable to take samples quite often, so as to watch the shade of both cotton and rayon. A lowering of the temperature will allow the color to go on the cotton and not on the rayon.

* * *

Rayon and Silk Fabric Ravels Easily

Technical Editor:

We attach a clipping of a cloth, the warp of which is rayon and the filling a 4 thread 13/15 crepe. The weave is a 5 shaft satin. You will observe this cloth ravels very freely when cut warpwise, and, as such, you can at once imagine that, from a dressmaker's point of view, it would be very difficult to handle and, therefore, objectionable. This being true, the sale of an otherwise very attractive cloth is limited. Would you kindly let us have any information as to how this cloth could be made so as to prevent this raveling? (5481)

This cloth is a five-harness satin, with about 150 ends per inch of warp, reeded about 50/3, of artificial silk, apparently about 150 denier size, and with a substantial twist to it—sufficient to eliminate much of the natural luster. It has been woven with about 80 picks of a four-thread, 13/15 denier crepe twist filling. Weight for weight, there is therefore about four and one-half times as much warp as there is filling. Owing to this ill-balanced construction, coupled with the fact of the weave being a satin, it is evident that the small number of thin filling threads can have but little hold on the mass of heavy, slippery warp ends, and, very naturally, the latter ravel off with the greatest ease.

To obviate this, the natural solution would be to establish a better balance between the warp and filling threads, as, for instance, by using a considerably finer warp, say 100 denier, and a coarser fill-

ing, say, six thread, or thereabouts, although the fabric in this event naturally would be lighter.

The fabric as it is might be considerably helped by weaving it in a two-and-one twill instead of in a five-harness satin, as this closer binding would offer much more resistance to the shredding out of the warp. Also, the trouble might be materially lessened by putting a heavy dressing on the back of the cloth so as to stick the threads together, coupled with a light breaking so that the fabric would not feel too stiff or boardy. I suggest that before changing the materials in the warp and filling, both of these two latter expedients should be tried, and then, if the three-harness twill weave, coupled with the gumming, does not correct the trouble sufficiently to make the goods usable, a radical change in the construction will have to be resorted to.

JAMES CHITTICK.

* * *

Peroxide Bleach on Rayon and Wool Hose

Technical Editor:

Would you be kind enough to give me a formula for bleaching artificial silk and wool plaited hose with hydrogen peroxide (in solution) and oblige? (5463)

First, the hosiery must be scoured, using 5% pure (neutral) olive oil soap and 2% silicate of soda. Give it one hour at 130 deg. F. Rinse thoroughly with warm water two or three times and hydro-extract. Then enter into the bleach bath prepared as follows: To every 100 gals. of water, add first 3 gals. albone 25 volumes per cent hydrogen peroxide. If using any other hydrogen peroxide, base the amount on the strength. For instance, if 100 volumes per cent, use ¾ gal.; if 12 volumes per cent, use 6 gals., etc. Then add ¼ lb. of tri-sodium phosphate and 3 lbs. silicate of soda. Stir well and bleach at 130 deg. F from three to five hours, or until desired shade is obtained. Tinting is conducive to a better color. After bleaching, rinse two times with warm water and once with cold water.

* * *

Dressing on Rayon and Worsted Yarn

Technical Editor:

What are manufacturers apt to use as a dressing for their product? Recently we purchased some fine worsted, twisted with rayon, sample enclosed, on which there was some kind of wax. The writer extracted with carbon tetrachloride some of the yarn, and on evaporating, the solvent forms a pale yellow substance of almost wax-like consistency. It chars very easily, and on one occasion an odor of ammonia seemed to be given off. If it belongs to the wax group, it can be but one, unless the chemical dictionary has omitted to name another wax soluble in carbon tetrachloride. We trust that perhaps you can offer some surmise as to what this wax is, as well as give us an answer to our first question. (5421)

Although a great variety of materials are used as dressings, practically all of these contain varying proportions of softening or lubricating substances and usually consist of oils, soaps and possibly, in certain instances, waxes. The inquirer requests that an opinion be expressed as to the nature of the wax-like substance that was extracted from the yarn with carbon tetrachloride. It is impossible to express an opinion as to what this wax-like substance consisted of. The only way this could be determined is to submit a sufficient amount of the yarn to a competent chemist for analysis.

There are a great many types of oils that are used in softening and lubricating yarns in the spinning, twisting and reeling operations, and these may consist of animal and vegetable as well as mineral oils. Where small amounts are extracted from the yarn with solvents, such oils oftentimes give a residue that has a greasy or waxy appearance and one might mistake this for a straight wax, whereas it could be oil or a mixture of oils. We would suggest, as stated above, that if the inquirer is sufficiently interested to learn the exact nature of the oil or waxy matter present in this yarn, he submit the same to a chemist for analysis.

* * *

Distinguishing Different Kinds of Rayon

Technical Editor:

Kindly advise the best method to distinguish the different kinds of artificial silk: for instance, Celanese from Viscose, Lustron, Dupont, Tubize, etc. Is it possible in a finished weighted silk fabric to strip off the weighting and finish so as to determine the original size of the silk. (5331)

Simple methods for distinguishing the different kinds of artificial silk are as follows: Celanese and Lustron silk can be considered practically the same as they are both cellulose acetate silks. Viscose and Dupont are the same type of artificial silk. Tubize is a nitrate silk.

It is very easy to distinguish Celanese and Lustron silks from the other artificial silks by a simple burning test. Viscose will burn and emit an odor similar to cotton, while Celanese and Lustron silks burn up into a hard knob at the end of the fiber, or sort of fuse. This test is very reliable when one becomes familiar with it.

Tubize silk, being a nitrate silk, can best be distinguished by dissolving some of the silk in concentrated sulphuric acid. To this acid solution add a trace of diphenylamine or brucine sulphate. With diphenylamine a blue color is produced, and with brucine sulphate a bright red color will develop. Lustron and Celanese silks are commonly called the acetate silks, and are not so water absorbing as Tubize and Viscose silks. For more detailed tests we refer you to pages 486-490, Matthew's "Textile Fibers."

In regard to determining the original size of silk in a finished and weighted silk fabric, we doubt whether it would be possible to strip off the weighting materials, especially if it was a mineral weighted silk (iron and tin loading) so that the original size of the silk yarn could be determined. However, we feel that approximate results might be obtained by unraveling a known weight of the yarn; drying to constant weight and determining the moisture. Extract with ether or chloroform to remove oil or fatty matter, such as softeners used in finishing; then boil well with water, rinse, dry and weigh again. The loss will represent finishing materials such as glue, gelatine, starch, dyes, oil and fatty matter.

The sample should then be ashed until all organic matter has been burned off, and the residue weighed, which represents the normal ash of silk—which only amounts to a fraction of a per cent. plus mineral loading or weighting materials such as tin and iron compounds. The moisture plus finishing compounds, plus ash or mineral matter, subtracted from the original weight of the sample as unraveled from the fabric, represents approximately the actual amount of pure silk, and this could be used in roughly estimating the size of the original silk yarn. We would not claim any great accuracy by this test, but it would serve in obtaining a rough idea as to the denier of the original silk.

A second method that can be used is to extract silk with ether to remove fatty matters and soak in a solution of hydrochloric acid at 100-120 F. This solution is made up with 1 part hydrochloric acid and 2 parts water. Soak silk in this bath from 1 to 2 hours, then rinse well until free from acid and boil in a soap solution or even plain water. Weigh before and after this treatment, making sure that both weighings are with the material in the same condition as regards moisture content.

A chemist to whom this inquiry was submitted replies as follows: Celanese and Lustron are acetate silks; the others are regenerated cellulose silks and may be divided as follows: Viscose and Dupont as xanthate silk; Tubize as nitro silk; Pauly as cupra silk. The burning test will show that the cellulose acetate silks will seem to melt and form a black, hard bead, similar to real silk when burned, but will not give the odor of real silk. The regenerated cellulose silks all burn in a similar manner to cotton, leaving very little ash, and that ash is very light and powdery.

Use samples of known origin for comparison in dyeing tests. If dyed with SRA colors, made by the Celanese Company, the Celanese will dye deeply, the Lustron not so deeply, and the others will either not dye at all, or will be lightly stained.

Boiling in water will destroy the luster of Celanese but I have not tried this on Lustron. Other art silks are not affected as to luster by this treatment. Dilute solutions of caustic soda or potash will disintegrate Celanese but I have not tried this on Lustron. This treatment does not affect the other art silks.

Run blanks with known samples in the following chemical tests: Ruthenium oxychloride with ammonia turns acetate silks slightly pink in spots; turns cupra silk very slight pink after two hours; turns xanthate silks bright pink after twelve hours; turns nitro silk a reddish color at once. Fehling's solution gives blue color with cupra and xanthate silks, and a greenish color with nitro silks. (Have not tried acetate silk.) Zinc chloride 20, potassium iodide 2, iodine .1, and water 15, turns acetate silks yellowish; cupra silks brown, which washes out; nitro silks, a reddish violet. Diphenylamine sulphate solution turns nitro silk blue; no color with xanthate or cupra silk; no record of acetate silks. These tests are not sharply defined, so it is best to run parallel tests using fibres of known origin.

With regard to stripping off the weighting and finish of silk so as to determine the original size of yarn, I have no data on this subject. Any method would give only approximate results, due to the many interfering factors when stripping. The following suggestion might be useful: If fabric is silk warp and filling, cut out large piece, measure length of yarn and count; weigh carefully; dry at 105 C., weigh; loss is moisture. Extract with petrolic ether to remove fats, dry and weigh; this second loss is fats. Extract with alcohol, dry and weigh; this loss is soaps. Extract with water, dry and weigh; this loss is gum and soluble material. Treat with hot dilute hydrochloric acid, wash well, dry and weigh; this loss is dye, etc. Ignite remainder and weigh ash. Add all the losses together, along with the ash; then subtract from the original weight; this gives weight of silk. From the number of yarns in the original piece, multiplied by their length, secure the total length. From the weight and the length, figure the deniers with the regular method for silk.

* * *

Scouring Rayon Knit Fabric

Technical Editor:

We wonder whether there is a more efficient method of scouring artificial silk fabric than that which we are using at the present time. The fabric is knitted on fine-cut circular underwear machines, and unless the artificial silk yarn is wound in oil, it will not knit satisfactorily. We scour the fabric in hot water with a very good soap, but it takes very long scouring and many rinses before the oil is all out of the fabric. (5480)

We suggest the method given below which is working out very satisfactorily on a practical scale with the rayon left in a clean and soft condition ready for bleaching, dyeing or drying, as the case may be. Make up a stock soap liquor with 100 lbs. of a good white chip soap, to which add 25 lbs. of trisodium-phosphate and 10 lbs. of 58% sodium carbonate, the whole made up to 100 gals. with water. Be sure all chemicals and soap are dissolved. If you have not this capacity tank, make up in a smaller or larger tank, keeping same ratio between the chemicals, soap and water given. Ordinarily one pailful of this soap liquor to 100 lbs. of rayon will be sufficient to give a good clean scour; but if this does not clean well, add more soap. In scouring, there should be a good thick soap lather all the time. Scour for one-half hour in hot water. Then give two good hot water washes of from 20 to 30 minutes. Finish with one cold wash, running goods until they are cold.

* * *

Finishing Rayon Lining

Technical Editor:

I am enclosing sample of cloth and would like to have information on finishing this class of material. I would like to know what would be required in the line of machinery to handle this cloth? (5390)

This cloth has a rayon face and cotton back. It is a reversed twill of a silesia construction for linings, designed to take the place of silk lining in overcoats and such garments. It is a well executed piece of work, and has been both well manufactured and well finished. The actual layout of machinery for finishing would depend on production. It has very evidently been singed over a four- or six-burner gas singer and then treated with some detergent product to remove sizing material, etc. Following this it has been scoured in either an open width continuous machine or on jigs, after which it has been treated, washed and dried.

The dyeing is done on dye jigs, after which goods are thoroughly washed and dried, given the softening or slight conditioning ingredients and tentered over a range consisting of six to eight cylinders, 90 ft. tenter with hot air heating system and winder, conditioned, and run over a 3-roll silk finishing calender with two felt paper rolls and a heated chilled iron roll.